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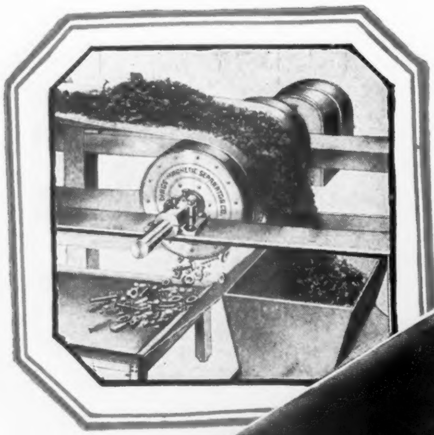

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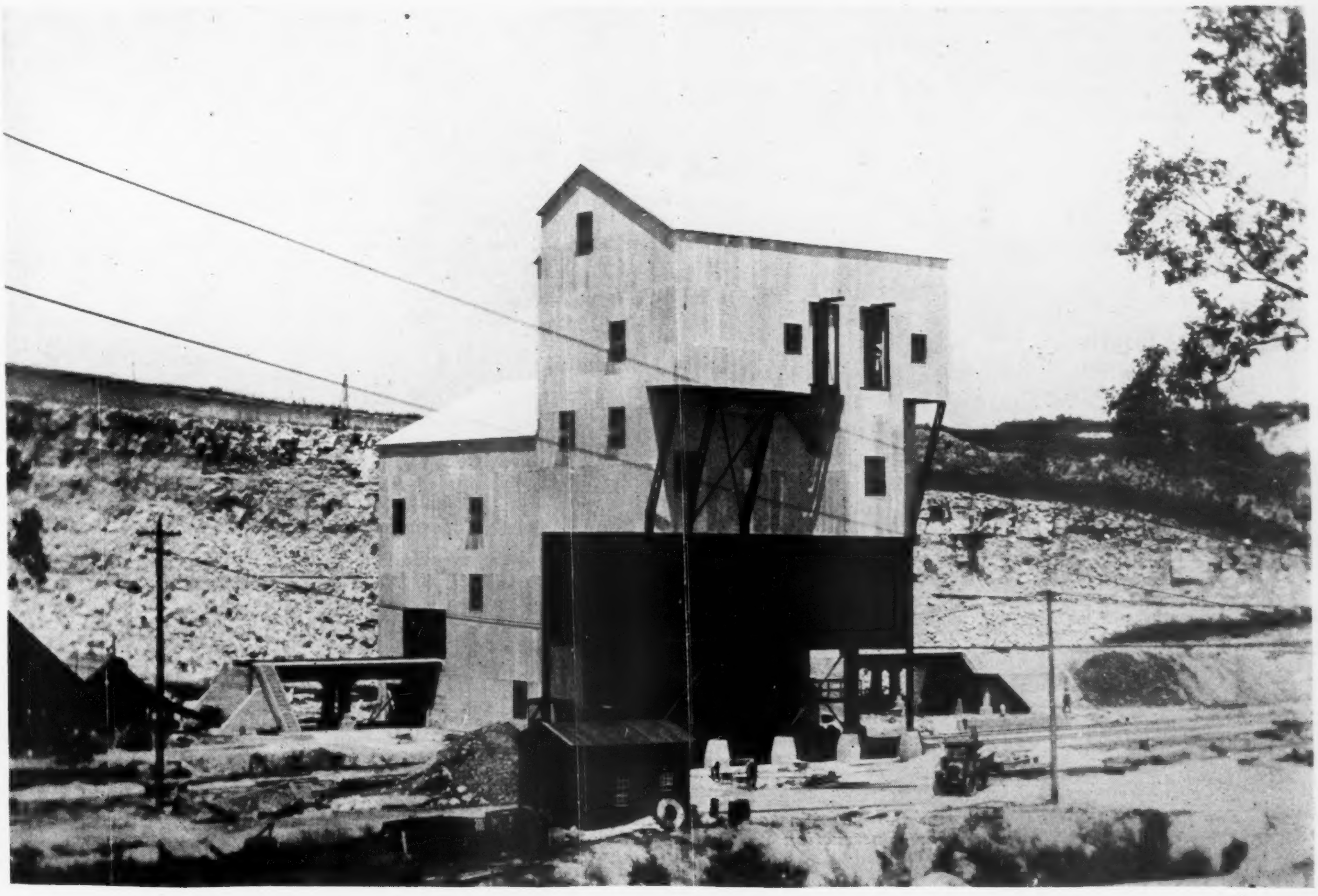
Volume XXVIII Chicago, August 8, 1925 Number 16

New Plant of the Columbia Quarry Co. at Krause, Ill.

A Well Designed Plant Containing a Number of Unusual Features of Construction and Equipment



The plant is of structural steel and steel-concrete. It replaces a plant which was burned last September

WHEN it was announced that the Columbia Quarry Co. of St. Louis would replace the plant at Krause, Ill., that was burned last year, it was expected by those who knew the advanced ideas of stone crushing held by E. J. Krause, the president of the company, that the new plant would be not only a good plant but an unusual one. These expectations have not been disappointed. The plant is not only among the best that have been built both in design and construction, but it contains a number of new features, some of which are so distinctive as to mark a real advance in the art of crushing and screening stone.

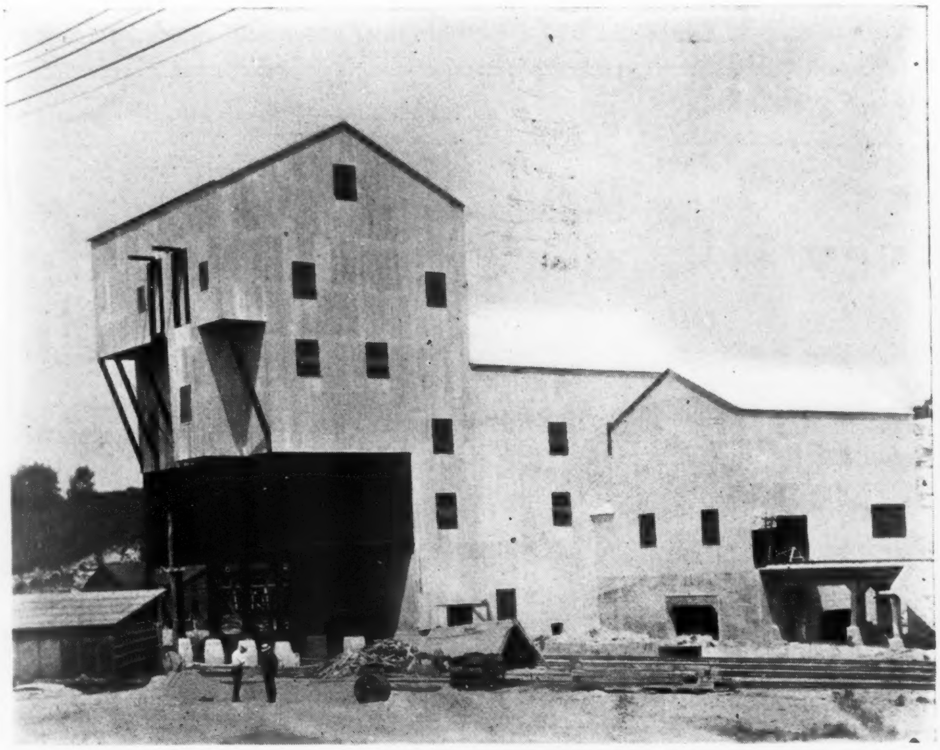
The design is the work of C. E. Glassen, the company's engineer, in connection with the engineering department of the Allis-Chalmers Manufacturing Co., which furnished all the machinery except as mentioned below. This does not mean that Mr. Glassen made a flow sheet and told the manufacturing company to build a plant to fit; it means that he designed the plant as a whole and worked out the important details. He has been with the Krause companies for a number of years and had experience in coal and other forms of mining as well as in stone crushing. And he was able to draw on this experience outside of the stone industry to design some of the most important features of the plant.

The construction is unusual if not unique in stone crushing plants, for everything is built either of structural steel or steel-concrete, not reinforced concrete but structural steel covered and protected by concrete. This is not only excellent from an engineering point of view but from the point of view of appearance. The steel concrete bridges leading in and out of the building show a fine sense of form and proportion. A minor detail which shows the care and thought that went into the design is the support of the gallery in front of the main sizing screens at the top of the building. This is held by braces which run back to the main columns, a construction which has ample strength but which is much cheaper than bringing columns to the ground in the ordinary way.

There are no floors in the building, only galleries around the machines where men need to go to attend to them or to make repairs. There is ample room for this work and having only galleries leaves the interior so open that a man can stand at the switchboard, from which all motors are started and stopped, and see practically everything in the plant. Hence he can be sure that everything is clear before he throws in a switch. Buttons for emergency stops are placed beside every machine, which makes the system especially safe.

As regards the construction, Mr. Krause said it was the intention to build a plant that would do away, as far as this is possible, with the heavy repair and maintenance costs which the ordinary plant has to incur after each season's campaign. And apparently this intention has been met. Every machine has been as solidly built and placed as is possible. As an evidence of the care that is taken, the method of placing the motors may be instanced. These are temporarily placed and tried out and as soon as they have been proved to be in perfect line they are grouted solidly in place. Steel beams have been used in the place of wooden bolsters under the crushers and all the other machines, with one or two exceptions where for certain reasons wood was to be preferred. Steel is used throughout for chutes, stone boxes, hoppers and bins.

Finally the plant is as fireproof as possible. No wood has been used anywhere except a little on the flooring of the galleries. This was done to save time in starting the plant, but the wood will be replaced by concrete during the coming winter.



The new plant, showing the primary crusher house at the right

The plant which was burned. As the picture shows, it was largely of timber construction

The unusual feature of the crushing and screening plant is the large capacity of the secondary crushers. This was put in because in so many plants it had been noted that the secondary crushers formed the "neck of the bottle," the primary crushing plant and the screening equipment being adequate enough, but the secondary crushers of such small capacity as to hold back the rest of the plant. In this plant a capacity of 400 to 450 tons per hour is expected. The manufacturers' rating (on this stone for the sizes wanted) of the secondary crushers is 700 tons per hour. The providing of overcapacity at this point not only insures full plant capacity under normal conditions but it also allows that capacity to be maintained when an excess of the finer sizes is wanted.

In detail the flow sheet is as follows: The stone is received from the quarry in 6-yd. cars of a special design which is adapted to the rotary tipple. This tipple is quite new, as it was designed by Mr. Glassen and built to his drawings by the Stephens-Adamson Co. It consists of a cradle into which two cars are pushed by the locomotive. The

cars have swiveled draw bars so that they need not be uncoupled. The cradle is then given a 90-deg. roll by means of two Curtis air hoists, 6-in. diameter and 9-ft. stroke. This turns the car on its side and, owing to its shape, it empties itself cleanly. The center of gravity is changed after the load is dumped so that the cradle and cars return to position by gravity. Two angle irons hold the car in place while it is being dumped.

As only a 90-deg. turn is given and as the cars do not have to be uncoupled or to be held to the rails by jacks or other fastenings, this rotary tipple is faster than some other forms. It makes a full cycle in 30 seconds, including in and out time for cars, and as two cars are dumped at once this gives a capacity of 720 tons per hour, a large excess over what is needed. The man at the crusher has only to open an air valve, the dumping and return of the cradle being automatic. The engineer spots the cars in the cradle and a light shows him when they are in the dumping position. The cradle cannot be rotated until this light shows.

Rotary tipples have been tried before in stone crushing plants but not with much success, as they were not fast enough. But it seems that this tipple has been worked out to meet all the conditions of speed and safety, and its use may mark an advance in the stone crushing industry.

The quarry stone falls directly to a No. 18 N. gyratory crusher. Chilled iron mantles and concaves are used, both on this and the secondary crushers. After passing the crusher the stone goes to a steel box 6x5x5 ft. This furnishes a bed for the stone to fall upon and breaks the force of the stone as it rolls into the elevator.

The quarry is worked in two benches. The total height of the face is 140 ft.

This elevator, which takes the crushed stone to the scalping screen, is of the close-connected bucket kind, the buckets and the belt being 42 in. wide. The belt is 10 plys thick and the pulley centers are 85 ft. apart. It discharges into a scalping screen which is 72 in. diameter and 20 ft. long. There are two sections to the main screen, the first having 2¼-in. r.h. perforations and the second 6-in. r.h. perforations. A jacket outside of the first section has 1-in. perforations.

The oversize, plus 6-in., goes to a No. 8 K-type crusher, the next size, 6-in. to 2¼-in., to a No. 10 McCully Superior crusher and the 2¼-in. to 1-in. size and the minus 1-in. size go to bins.

The last mentioned sizes are lifted to the upper part of the plant by two elevators, with 14-in. and 9-in. buckets. Here another screen and some washing equipment will be placed in the near future. A part of the washing equipment has already been ordered.

The products of the two secondary crushers go to a 36-in. belt elevator of the close connected type which has 93-ft. pulley centers. This raises the stone to the two main sizing screens, each of which is 60-in. in diameter and 24 ft. long. The sections have 2¼-in., 2-in. and 1½-in. r.h. perforations and the jacket has 1-in. perforations. The oversize goes back to the No. 10 crusher by a belt conveyor. The products, 2¼ to 2-in., 2-in. to 1½-in. and 1½-in to 1-in. go to bins. The sizes below 1-in. go to a pair of hexagonal screens covered with ½-in. mesh wire cloth. The oversize, 1-in. to ½-in., goes to a bin and the undersize to another pair of hexagonal screens covered with 3/16-in. mesh wire cloth. The oversize, ½-in. to 3/16-in., goes to a bin and the undersize to screenings storage. It is sold for agricultural limestone.

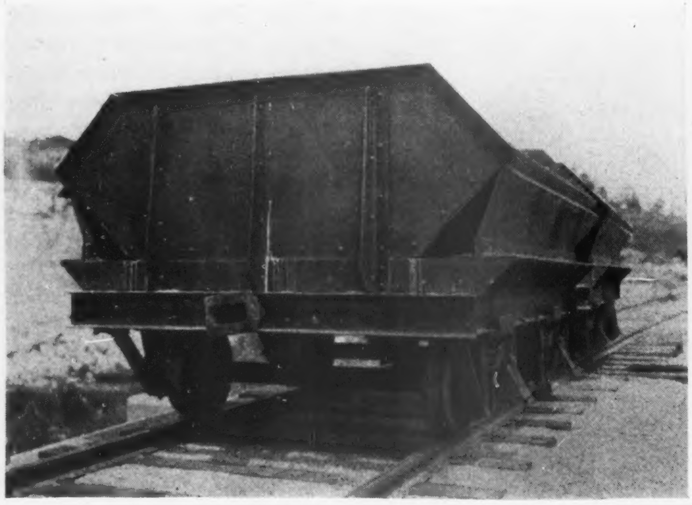
The hexagonal screens mentioned are of a unique pattern. They were designed by Mr. Glassen and built by the Stephens-Adamson Co. There are six replaceable sections and a frame on which are plates which are struck by falling hammers as the screen revolves, which keeps the screen from blinding. The whole screen is incased in a cylinder of plate which catches the oversize and takes the place of a hopper. This is a construction which is new and it has the advantage of requiring less headroom than the ordinary construction. It would seem especially

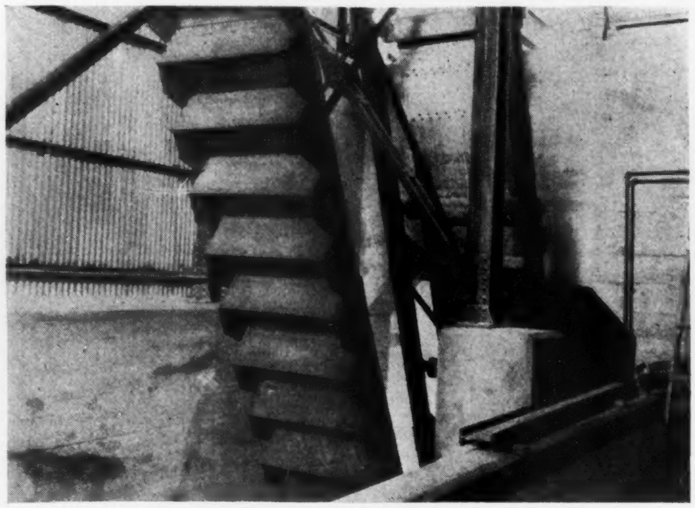
Rotary car tipple which is of a design new to the crushed stone industry

applicable to hexagonal screens in which the sectioned may be changed from the end. It is also a very cleanly construction.

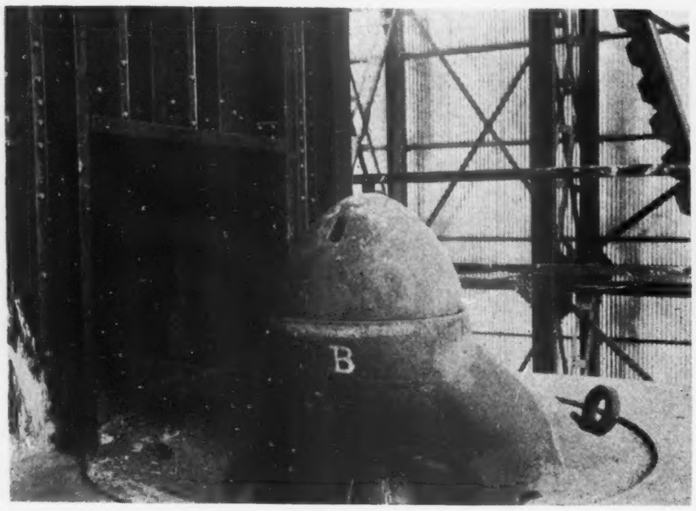
The bins hold 1200 tons and are of steel plate with concrete floor. Later the sides are to be coated with "gunite" so there will be no wear on the steel plate at any point. If the "gunite" wears it can be easily replaced.

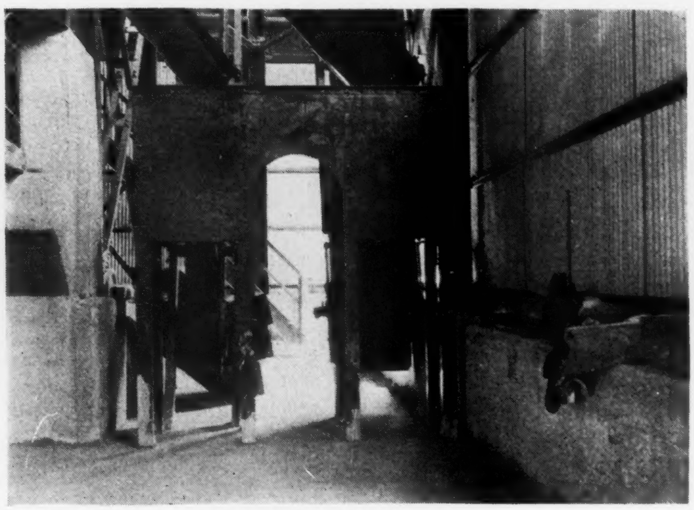
Allis-Chalmers motors are used throughout and practically all of them are of the slip-ring induction type. The exceptions are squirrel cage motors. Drum type Cutler-Hammer starters are used and these are collected at one switchboard. The main switch



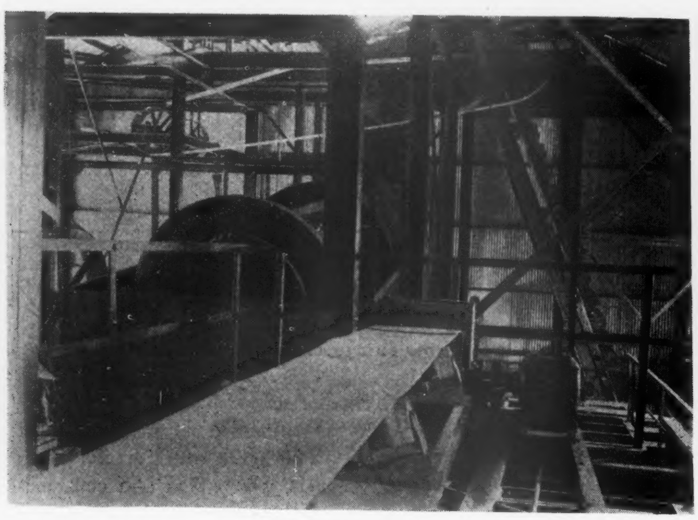


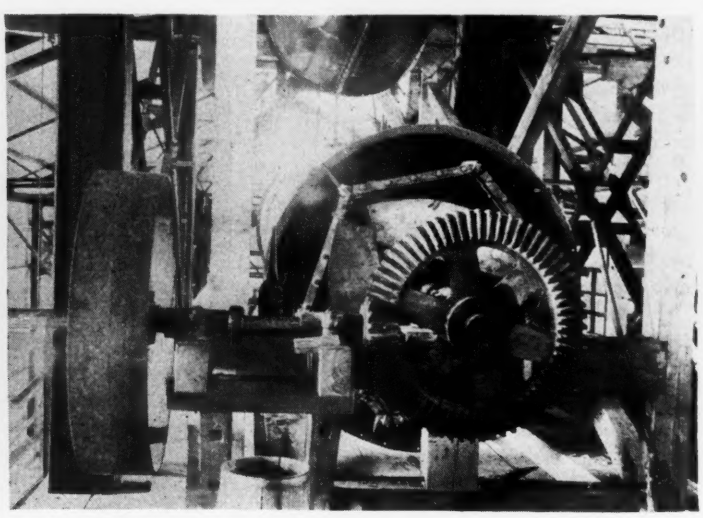
Left—Special type of car adapted for use with the new rotary tipple. Right—The 42-in. elevator which takes the primary crusher discharge to the scalping screen



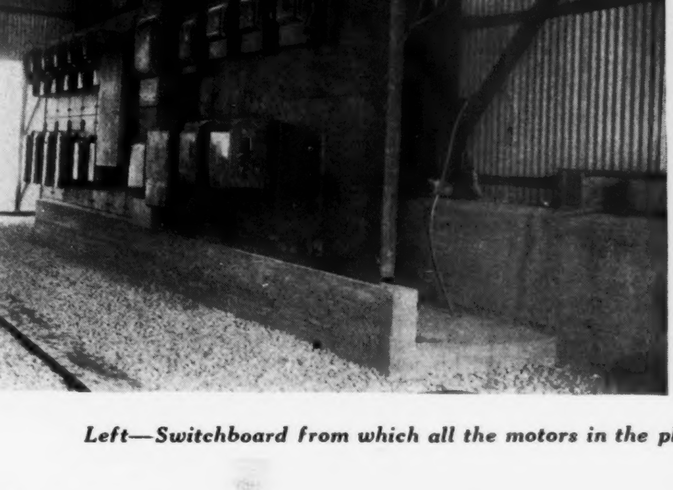


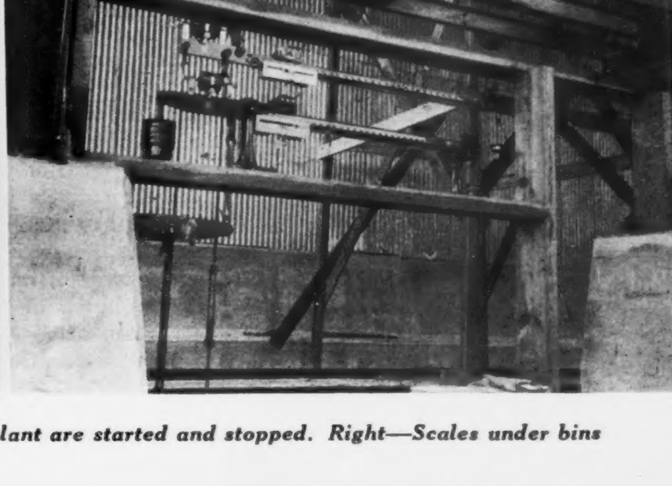
Left—Steel stone boxes used for feeding the secondary crushers. Right—Steel boxes and chutes to the elevators for small size stone



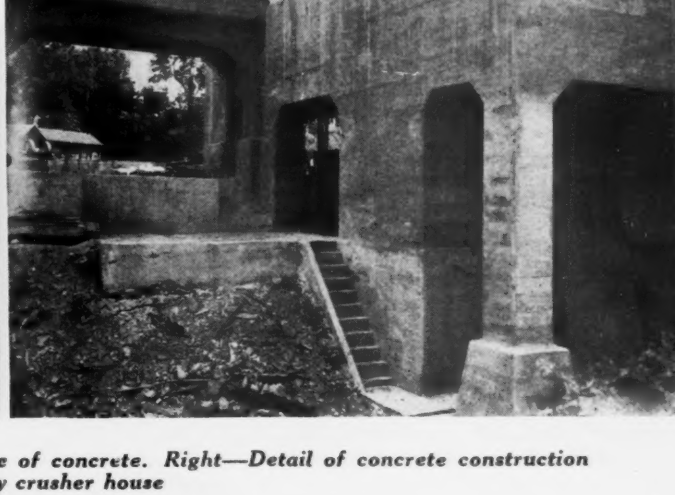


Left—Conveyor for sizing screen oversize, the only conveyor in the plant. Right—One of the four hexagonal screens for screening small sizes. Note the cylindrical casing which takes the place of a hopper

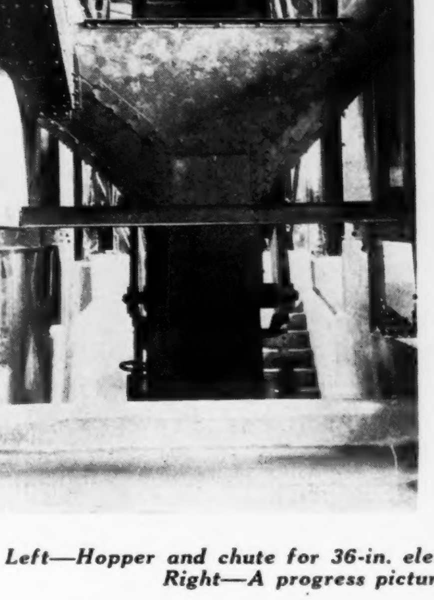


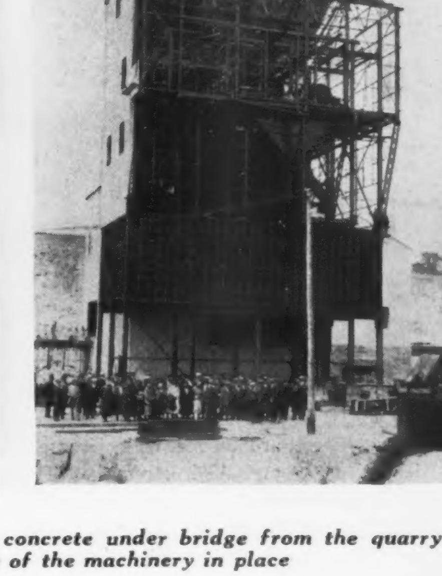


Left—Switchboard from which all the motors in the plant are started and stopped. Right—Scales under bins



Left—Transformer house, a handsome small structure of concrete. Right—Detail of concrete construction under primary crusher house





Left—Hopper and chute for 36-in. elevator. Center—Steel columns encased in concrete under bridge from the quarry. Right—A progress picture which shows the steel framing and some of the machinery in place

is a Type A Trumbull safety switch which cannot be thrown while the door of the box encasing it is open.

The construction of the plant involved

E. J. Krause, president of the Columbia Quarry Co.

some engineering problems, one of which was keeping the water out of the pit for the bottom of the 42-in. elevator and stone-box. This was solved by building a brick wall inside the cut in the rock and pumping the space between the brick wall and the rock dry while the forms were being placed and filled. Afterward this space was grouted in.

The quarry has been worked in two faces, the height of both totaling 140 ft. The

Base of primary crusher

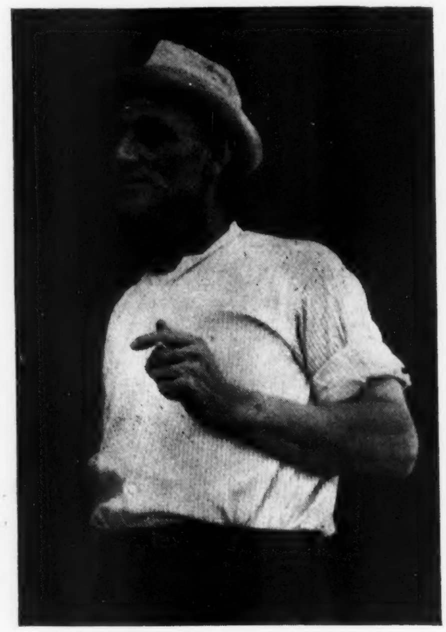
rock is broken by 6-in. well drill holes put down by a Sanderson-Cyclone rig, spaced from 9 to 11 ft. and set 17 ft. back from the face. These are loaded with Grasselli powder of 60% and 40% strength. The loading is spaced according to the character of the rock. An interesting feature of this part of the work is that experts from the Grasselli company are employed to load and fire the holes, and this has resulted in very low cost blasting.

The rock is loaded by two Bucyrus steam shovels, a No. 95 and a No. 70. The quarry cars are pulled in by 8-ton Plymouth gasoline locomotives. Two locomotive cranes are employed in stockpiling and other work about the plant, one of Link-Belt make, the other a McMyler Interstate. Howe scales are used for weighing cars.

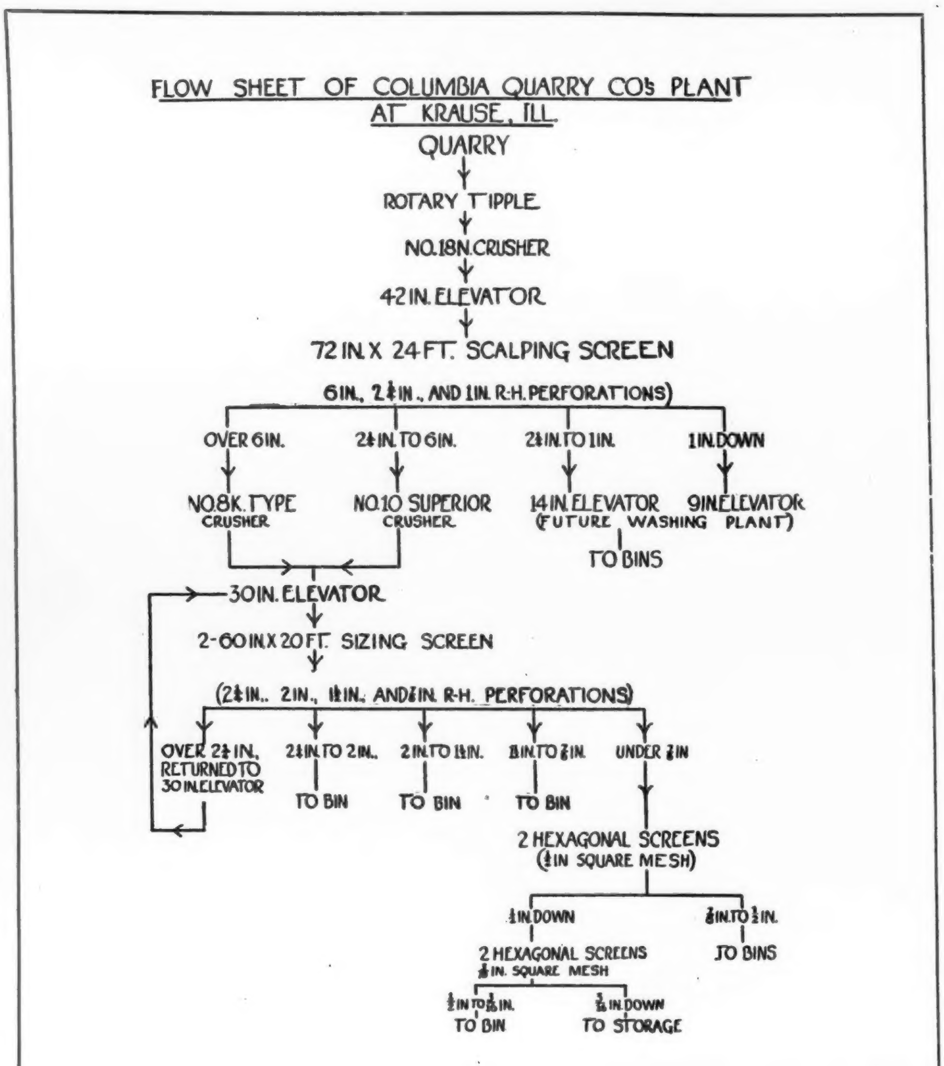
All the concrete in the plant was made with screenings for fine aggregate. This is interesting because it is sometimes said that concrete made of screenings does not finish well, and in this case the finish of the concrete is remarkably good. About 12 carloads of cement were used in building the plant.

Shipments are made over the Missouri Pacific road. A new railroad is shortly to be built into this section which will give a shorter haul and direct connections to both the Missouri Pacific and Illinois Central roads.

The officers of the Columbia Quarry Co. are in the Century building, St. Louis, and the company operates a number of plants in the vicinity of that city. E. J. Krause is president and C. H. Krause is vice-president of the company and C. P. Tigges is secretary and general manager. C. E. Glassen is engineer at the Krause plant and C. E. Klaus is superintendent in charge of operation.



C. E. Glassen, engineer of the Columbia Quarry Co.



Theory and Practice of Lime Manufacture*

Part IV — Judging Kiln Performance by Gas Analysis

By Victor J. Azbe
Consulting Engineer, St. Louis, Mo.

PART III of this series, which was published July 25, discussed the important sources of fuel loss other than excess air, namely, incomplete combustion and radiation. In this number Mr. Azbe discusses the method of judging kiln performance from gas analysis.

Kiln Gas Analysis

Kiln performance can be judged quite well from gas analysis, but the man attempting to do this must learn to obtain a correct and average sample and also must learn to interpret the results of the analysis. There are a great many items to be taken into consideration but if they all are included the "Ratio pounds of lime per pound of fuel" and the "Kiln thermal efficiency" will be revealed and much other information such as, to an extent, why is the kiln performing so well or not so well.

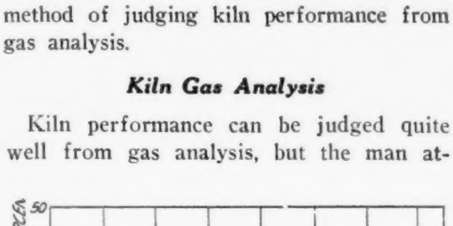


Fig. 8. Chart for determining lime-fuel ratio assuming complete combustion

The accompanying "Master Chart" (Fig. 7) for determining kiln efficiency and lime fuel ratio from kiln gas analysis gives both the formula for calculating and the graphical outline. The variables that are taken into consideration to determine efficiency and ratio are "Heat Value of Fuel," "Available Hydrogen in Fuel," "Carbon Dioxide," "Oxygen," "Carbon Monoxide in Kiln Gas," "Percentages of Calcium Oxide," "Magnesium Oxide" and "Impurities in the Lime Made." The directions to use the chart are also given on it.

It is true that the chart appears quite complicated, but it is not nearly as bad as it appears. It was impossible to make it any simpler than it is due to the very great number of variables, all of which have an important bearing. For plants burning a definite kind of coal and using a definite kind of limestone, simpler charts can be assembled from this Master Chart.

The chart is usable for any fuel up to 20% hydrogen and so fuel oil is included. For any lime containing from 0 to 100% of CaO or MgO it has a range great enough to include any obtainable ratio with present day kilns. It takes in incomplete combustion to the extent of 10% CO, excess air up to 15% and carbon dioxide to 40%. It does not take into consideration the possible presence of methane and hydrogen in waste gas.

It is, of course, understood that the more CO_2 escapes from the kiln top, the higher will be the ratio, this assuming that there is no oxygen in the waste gas, that there is no excess air, and the fuel burned is the average bituminous coal; then, if CO_2 found in the waste gas is 18.5% evidently no lime is made because this CO_2 percentage is accounted for by the burning of the carbon in the coal. From this point on, the greater the CO_2 percentage, the more the proportion of the CO_2 driven from the limestone and so the greater is the lime fuel ratio.

A simpler chart, but not as extensive in possible application, is given in Fig. 8. The ratio is plotted against CO_2 and O content of kiln waste gas and lines are drawn for different heat values of the bituminous coal burned. This chart was calculated for high calcium stone. It was assumed that the combustion was complete; if combustion is not complete this chart becomes valueless and the master chart must be used.

It may be well to state that the ratio is based on coal as the coal heat value is taken, in both master chart and Fig. 8. If the heat value is on dry basis, the ratio is on dry basis also and if the ratio is to be on "coal as received" basis, the heat value of fuel must be taken that way too. Further, it is well not to take heat values as given out by the coal companies because they quite often are far higher than the actual.

The chart indicates that the ratio varies with the variation of the combined figures O and CO_2 and the higher the two, the higher will be the ratio; however, this should not be taken to indicate that a higher oxygen content is desirable. That it is highly detrimental, was already explained. In this chart, it merely indicates that the

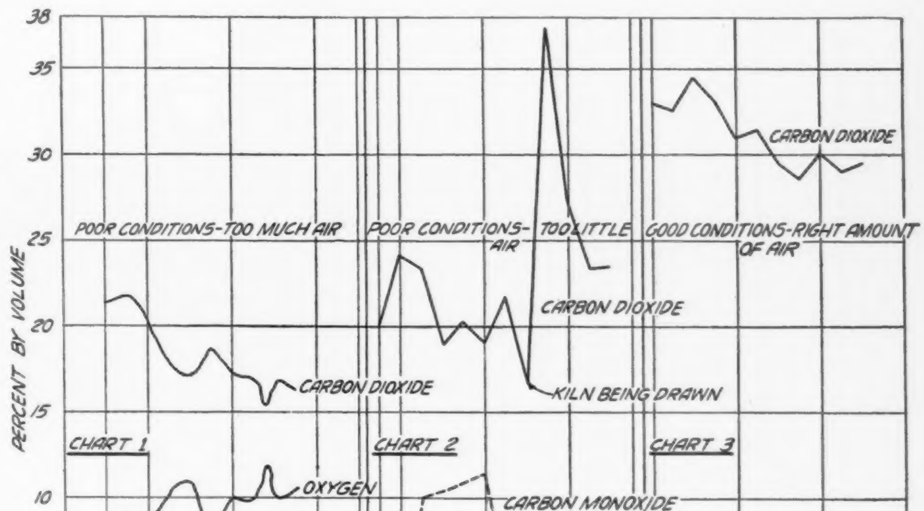


Fig. 9. Three charts showing conditions of too much, too little, and right amount of air

*From a paper read before the National Lime Association Convention, May 28, 1925.

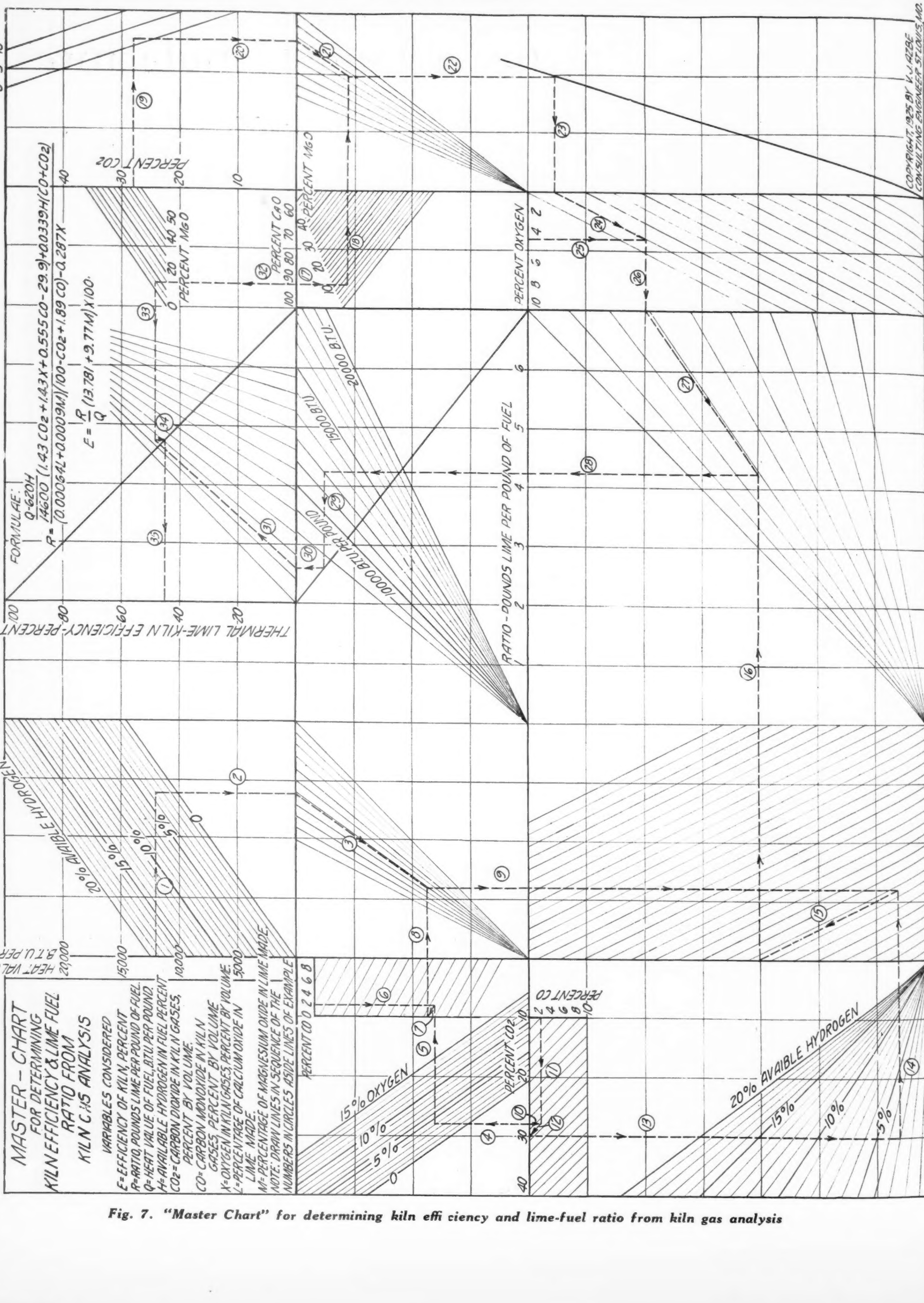


Fig. 7. "Master Chart" for determining kiln efficiency and lime-fuel ratio from kiln gas analysis

total volume increases when excess air is used, and thus the CO_2 becomes diluted; but it happens that the oxygen has a proportionate volume value to the CO_2. If the oxygen figure was reduced and CO_2 increased after a time the kiln would get in better condition, the ratio would become higher and so also the combined figure of O and CO_2, than was the case of very high O.

Results of Kiln Gas Analysis Tests Made at Different Plants

Fig. 9 gives three charts, the results shown were actually obtained in plants.

Chart I (Fig. 9) illustrates poor operating conditions due to excess air. It will be noted that there is no carbon monoxide so combustion is complete; but there is a

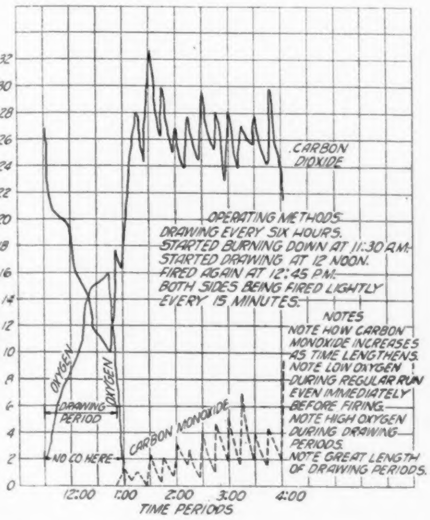


Fig. 10. Diagram of results of gas analysis when firing was frequent and regular

great excess of air as shown by the high oxygen content. The kiln is getting in bad condition very rapidly, the CO_2 is dropping. When the test was begun the combined figure CO_2 and O was 30.5%. After one hour and a half operating with high O (too much air), the combined figure is 26.5%; and it is continuing to drop. The kiln is making lime on stored heat, not much on the heat put into it. It soon will reach the point where its capacity will be so low that operation will not be practicable except conditions are improved.

Chart II (Fig. 9) shows poor conditions again, but in this case due to too small amount of air and consequent incomplete combustion. Carbon monoxide is very high, at one time as high as 11½%. Oxygen is very low excepting when the kiln was drawn. During ordinary run, the amount of oxygen is less than 1% and that must be leaking into the kiln above the zone where combustion is taking place.

The high CO_2 observed immediately after drawing is a peculiarity often encountered. It can be due to two causes—one being that the long flame penetrated to the zone where stone was fully preheated but entirely undecomposed on its surface, and so a large amount of CO_2 gas was rapidly given off, the second possibility is that after the fire was cleaned a very large amount of coal was thrown on the grate so practically sealing the grate to air admission, the fuel bed being cold, did not have sufficient draft effect of its own to draw in air, and since the kiln stone kept on giving off CO_2 on stored heat, the percentage naturally greatly increased. Here too the kiln was gas fired, but if air and gas are shut off, the same effect will result. After drawing the carbon monoxide immediately came back up again and oxygen became less than one per cent.

Chart III (Fig. 9) illustrates good conditions. Oxygen ranges around 2%, carbon monoxide is practically absent and CO_2 is high especially during the first part of the test. Conditions are regular, there is little fluctuation. The only peculiarity that would make one claim that the conditions could be improved is the dropping CO_2 which will be explained further on under "Heat Transfer."

Fig. 10 gives waste gas analysis in another plant where the hand firing was exceptionally regular and frequent. The carbon monoxide (CO) was present even before firing, while after firing it increased by several per cent. The amount of CO also continued to increase the dirtier the fire got, and on the last analysis four hours after cleaning and one hour before the next drawing, 9½% CO was found in the waste gas. Oxygen was entirely absent, excepting during the drawing period when it was very high. At 12:45 the oxygen was 16% and no fire whatsoever on the grates so no CO_2 was evolved from combustion; still, the percentage of CO_2 in the waste gas was 10%, all from the limestone which continued to give off CO_2 with stored heat.

Fig. 11 is most interesting. The results were obtained from a hand-fired lime kiln whose fireman did not know that he was watched and so was caught when he fired very heavily. Then, for two hours he did not put any more coal on the grates. At 2:15 p. m. he fired, with immediate great waste of carbon monoxide from the kiln top. At 2:20 the carbon monoxide (CO) was 8½%, which amount was gradually reduced until at 2:57 there was no CO. When the coal was fired, the amount was so great that for a short time there was little air passing through the grate. This is shown by the high percentage of CO_2 in relation to other gases, this being due to less gas volume coming from the furnace, and so the gas evolved from limestone predominated to a greater extent. For convenience, the figure is divided into zones.

Zone A—The incomplete combustion was here at its worst, partly because the fuel bed was clogged and partly due to the long flame which licked up far into the kiln and decomposed some of the rock which did not as yet have an insulating layer of lime on its surface. The waste of fuel in this zone was very great.

Zone B—Incomplete combustion still continues but carbon dioxide coming off from lime while less than in *Zone A* is still high. This is probably all due to the long flame licking up high into the kiln. This long flame is the result of the distillation of volatile matter. The fuel waste is still great.

Zone C—This zone of 21 minutes duration is ideal from the combustion standpoint. Carbon monoxide during its earlier part disappears, and oxygen during its latter part does not get high. Peculiarly, here the kiln is making the least lime which is shown by the low CO_2 evolution from limestone. This is due to wasteful conditions existing in *Zones A* and *B*.

Zone D—Here combustion is going on with an increased amount of excess air shown by the rapidly raising oxygen curve. This means waste. Still the CO_2 from lime is increasing which means that we are just beginning to realize on the ideal combustion conditions that existed in *Zone C*.

Zone E—Here the kiln makes the most lime in the burning zone. The CO_2 from lime is high. Here we are realizing at the

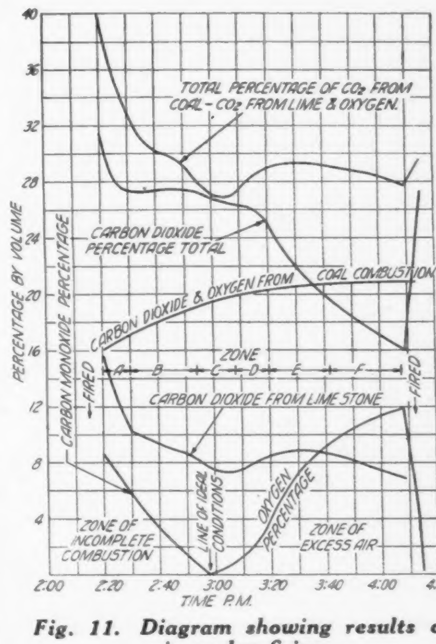


Fig. 11. Diagram showing results of irregular firing

fullest the benefits from *Zone C* operating conditions. Combustion is however, wasteful. Oxygen is still increasing.

Zone F—The kiln is operated very wastefully. Excess air is very high and the lime in the kiln is cooling and the CO_2 from lime is dropping, which means production is dropping off rapidly. At 4:09, the time just before firing, the kiln was making 24% less lime than it did at 3:30 and what lime was made was due to the heat imparted in *Zones C, D* and *E*. The coal burned in *Zone F* is a total loss, in fact, more since temperatures are so low, due to the great amount of excess air, that the lime charge is being cooled and possibly some of the lime recarbonated.

(To be continued)

J. L. Shiely's New System of Truck Delivery

Drivers Own and Maintain Their Trucks and Deliver at Rates Fixed By Districts

THE J. L. Shiely Co. of St. Paul, Minn., has adopted a system of local delivery, which has worked out very satisfactorily to the company and its customers. For several years this company owned and maintained its own local delivery system, and when it is considered that the company produces about 3000 tons of stone, sand and gravel daily from its two plants in St. Paul, and that about 80% of this production is sold locally, one can appreciate the large number of trucks which were necessary and the amount of superintendence and maintenance required. After several years of operation of its own trucks, the company decided to try a new system which so far has worked out very well.

Every Driver Owns His Truck and Maintains It

Reliable truck drivers, some of whom were formerly employed by the company, and others who had the means to finance their own trucking equipment, deliver the material. Each driver owns and maintains his own truck, and they are given numbers, according to their seniority with the company. That is, that driver who has been longest in the employ, or has been with the company the longest, is No. 1 and so on down the line. When business warrants the use of, say, 20 trucks, the first 20 on the list in service are called to report for work; if, for some reason or other one of the first 20 does not report, he loses his seniority and is placed back at the end of the list. This means that he will be given work only when every other driver working for the company is busy. Of course, if the man can show good reason for not reporting, he does not lose his seniority.

The drivers all work on a ton basis. The trucking areas have been divided up into squares on a map and each square or district is numbered. The drivers are paid at a certain rate per ton, depending on the truck district to which the load is to be delivered. Each district has its own rate, depending on the distance from the plant, the condition of the road and other matters which might increase the difficulty or time required for making the delivery.

In quoting a price delivered on the job for material, the Shiely company merely adds its f.o.b. plant price to the standard rate for delivery to the particular delivery point. In this way it can figure on a certain profit per ton and does not have to worry about truck maintenance and operation or labor problems and the like. The rates paid are fair, and if a driver works conscientiously he can earn a very satisfactory income.

Trucks at one of the Shiely sand and gravel plants. They are called out and lined up in the order of their seniority with the company

Fleet of trucks before the Shiely crushed stone plant

How the Buyer Benefits

This system also means that the contractor or user who operates close to the plant gets the benefit of the rate differential, and is not called upon to pay the delivery cost of the user who works a considerable distance from the plant, as he is in cases where a standard rate per ton, or yard, delivered on the job, is quoted to all alike.

This system of handling local trucking is worth serious consideration by those producers who do a local business and who are located in large centers of population. Mr. Sheily has found it about 10% cheaper than the old system during the period that it has been tried out.

Franklinville Plant of the J. E. Carroll Sand Company

A Plant Which Is Modern in Design and Construction Built to Work a Deposit of Unusual Depth and Extent

THE Franklinville plant of the J. E. Carroll Sand Co., Buffalo, N. Y., is a good example of the evolution that is taking place in the sand and gravel industry today, through which plants are continually increasing in capacity and being built in a more substantial manner in order to avoid stoppages for repairs and improvements.

The plant was built in 1924. A single season's service was enough to demonstrate that its capacity must be increased to supply the demands of the market. And while the plant was being rebuilt for that purpose, it was deemed advisable to rebuild some portions in a more substantial way, using steel in the place of wood for supports and to make some changes in the layout and method of operation.

The plant is about three miles out of Franklinville and perhaps 60 miles from Buffalo. The deposit is very large and deep. It has been proven to be of commercial grade at a depth of 165 ft. in one point, and all over the 147 acres which are being worked at the present time the sand and gravel is known to extend to great depths. About 60% of the material is gravel and there is a considerable amount of oversize that requires crushing. This is not looked upon as a disadvantage, as the crushed oversize makes an excellent concrete aggregate. Perhaps 50% of the gravel produced is crusher product.

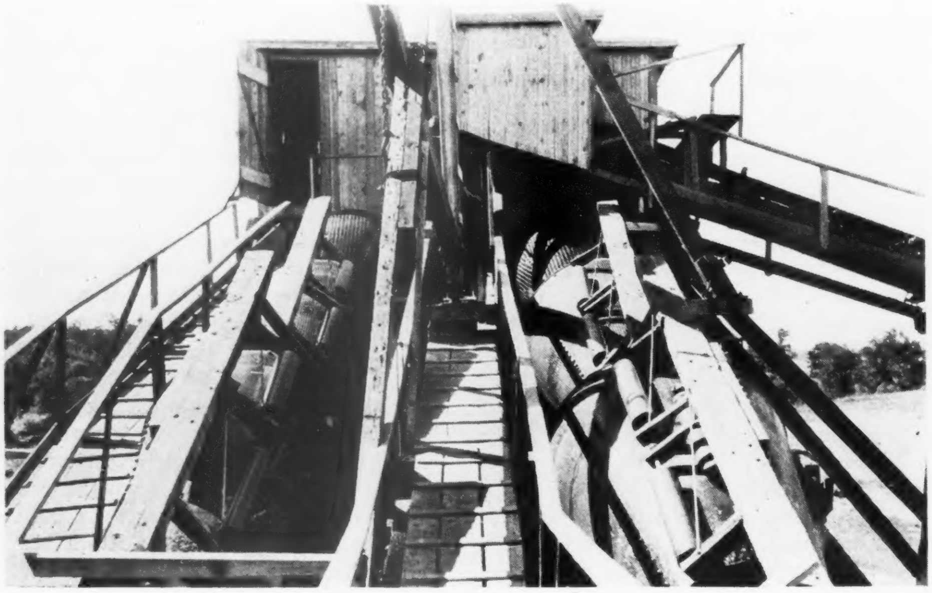
Three methods of excavation are employed at this deposit. There is first of all a Sauerman cableway dragline with a 2-yd. bucket, which was the first machine used. Then a Marion No. 37 electric shovel was purchased. This is of the "whirley" type and has a somewhat longer boom than usual. A Green 3½-yd. crescent scraper bucket was afterward installed. The reason for using more than one type of excavator is to be found in the nature of the deposit. The lower part has become somewhat consolidated with pressure and does not yield easily to the cableway or scraper bucket, although the electric shovel digs it easily enough. The lumps of this consolidated material crumble readily in passing through the plant and "melt" when the water strikes them, but they offer considerable resistance to the dragline bucket. A locomotive crane with clamshell bucket, such as the company uses with great success in its Attica plant, was tried out but it did not work well in the hard gravel.

The scraper bucket and the cableway bucket, which are operated by a 200 hp. Thomas electric hoist, draw the material

The deposit is very deep, as shown by this picture. Good sand and gravel has been found 165 ft. below the ground level

from the upper part of the deposit and dump it over the brow of a hill which is above the plant hopper. (Only one of these is used at a time.) This is an ingenious way of providing storage above the hopper, as the material flows down the hill and into the hopper as fast as the hopper is emptied.

The electric shovel digs from the bank on a lower level and loads into 6-yd. Koppel side-dump cars, which really hold from 7½ to 8 yd. when the load is heaped up. These are drawn to the plant by a 8-ton Plymouth gasoline locomotive, of which there are two in service at this plant.

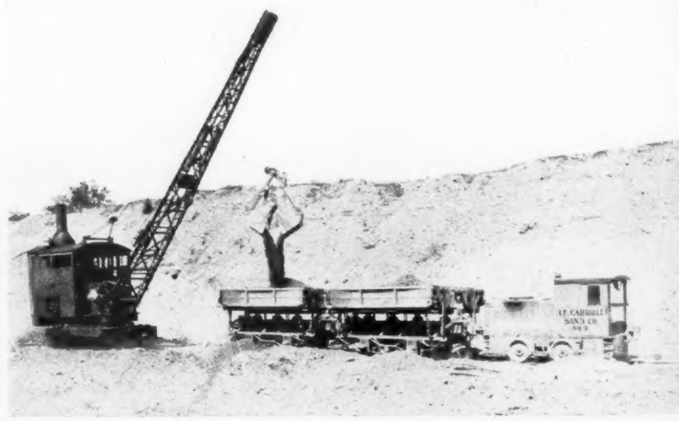


The conical screens are very large and are kept from blinding by the rollers shown in this picture

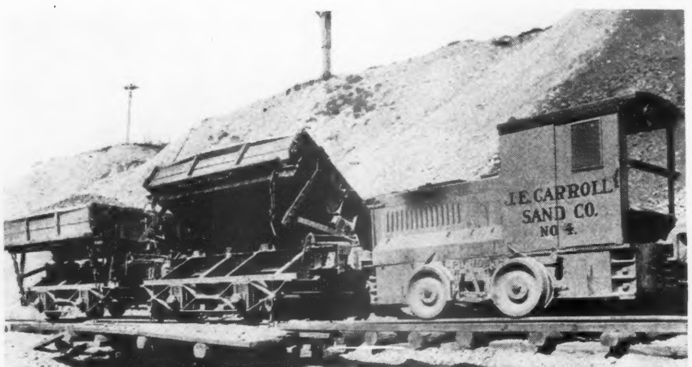
The side-dump cars drop the material into the plant hopper, which is of concrete, 14x18 ft. on the ground, with a sloping side. A Link-Belt apron feeder takes it from the hopper and delivers it to the first of the plant belt conveyors, which is 30 in. wide and 140 between pulley centers. This discharges into an Allis-Chalmers scalping screen 16 ft. long and 60 in. in diameter with 2¾ in. holes and a dust jacket that has 1¾ in. holes. It is of the type commonly seen in crushed stone plants. The purpose of the dust jacket is usually to convey the crushed material which has passed the inner jacket, except at times when a finer size of gravel is being made.

The oversize of the screen goes to two Allis-Chalmers crushers, a No. 5 and a No. 4. The product of these crushers goes to a "return" belt of 48 ft. centers, which delivers it to a small bin above the main plant belt. This bin is provided with an adjustable gate by which the contents may be fed to the belt in such a way as to equalize the feed to the plant. As the crusher product is returned to the screen, only material which has passed the 2¾-in. holes goes on to the washing plant.

The undersize of the scalping screen, which is the feed to the washing plant, is carried by a 30-in. conveyor with 190 ft.



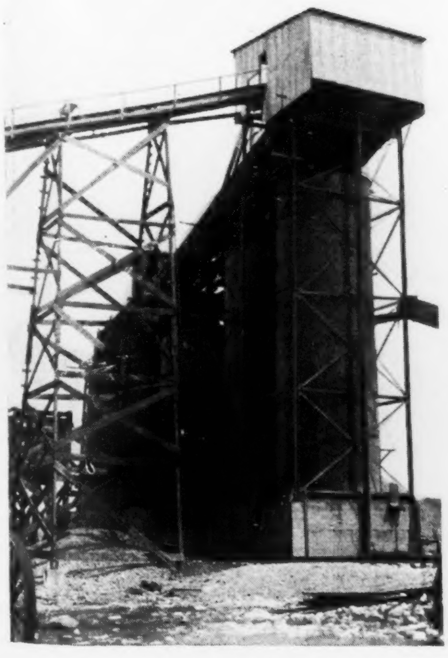
Left—Electric shovel at work on the bank. Right—Loading with locomotive crane. This method was not successful on account of the nature of the deposit



Left—Side dump cars discharging at hopper. Right—The scalping screen and the crushers below

centers. It falls into a box at the top of the plant, where it is joined by a stream of water. Water and sand and gravel are split into two streams, each of which goes to a line of Link-Belt conical screens. These are very large screens, the larger diameter being 96 in. There are four in each line

View of the entire operation. The deep pit shown in the first picture is just beyond the first belt conveyor shown here



The steel bins and heavy concrete foundations

Gates in the bins above the storage conveyor send the products to storage as desired

and each has a roller to keep it from blinding.

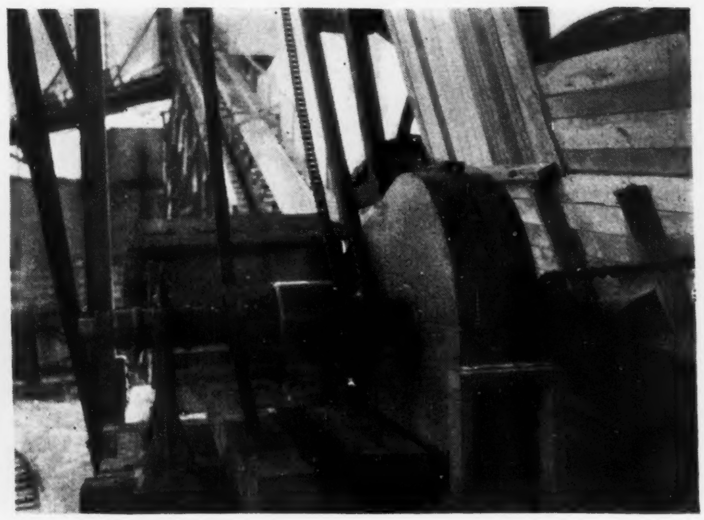
Since this plant was visited, and the above written, a 36-in. Symons disc crusher has been added to the plant. This has a capacity of 30 to 35 tons per hour, crushing the coarser sizes of gravel to ½-in. and finer. There is a good market for pea gravel in this section principally for road covering.

The sand from the last of these screens goes to two sand boxes, which were designed and built at the plant. These have flight conveyors by which the settled sand is drawn out.

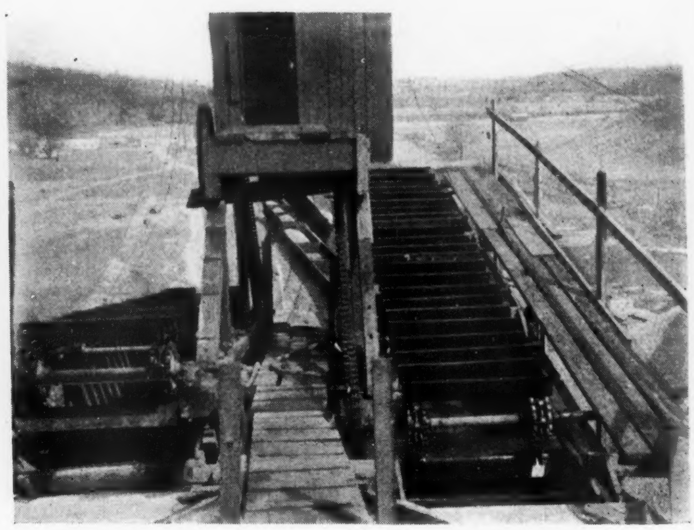
All the screens and the sand boxes are supported on a structural steel frame which is built over the steel silos into which the sand and the various sizes of gravel fall. In this way all the vibration of the plant is kept from affecting these silos. At the upper part of the silos are gates by which any of the sizes of gravel may be fed to a horizontal belt with 160 ft. centers and 54 ft. above the ground by which it may be delivered to a storage pile. Car loading is by side gates in the silos, of the segmental type. Cars are moved by a Meade-Morrison car puller.

The water supply of this plant is one of its most interesting features. The water comes from a well which is 12 ft. square and lined with concrete for about 50 ft. down. This square portion ends at the water level in the gravel and below this is a steel cased section 6 ft. in diameter, 22 ft. 6 in. deep. At the bottom of the square section there is a 6-in. Allis-Chalmers pump, which delivers into a 10-in. riser line that goes to the top of the plant. A 10-in. pipe was used throughout to lessen the

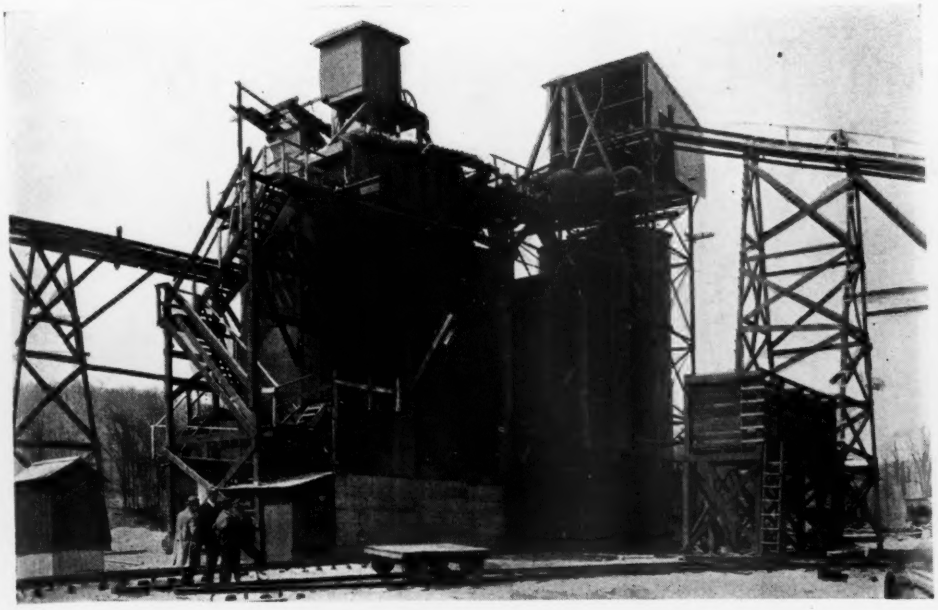
View of plant and storage pile from the west



Left—The crossing of the plant belt and return belt that carries the crusher discharge to the hopper. Right—Silent chain drive of scalping screen



Left—Crushers which take the oversize of the scalping screen. Right—The sand boxes with flight conveyors which were designed and built at the plant



Showing the construction of bins and the steel framing which supports the screens independently from the bins

friction head. The suction of this pump is provided with a 6-in. foot valve and a 10-in. check valve keeps the pipe from emptying when the pump is shut down. The digging of this well was a regular caisson job, and while the well supplies ample water for present purposes it is proposed to put down another of the same type 1000 ft. to the west for a reserve supply. A 3-in. centrifugal pump is in place to pump out the well in case the shaft becomes flooded and a hand pump is used to prime the main pump when this is necessary. Winter and summer the water from this well is always at the same temperature, 42 deg. F.

Although ample water is used, the principal reason for its use is to help in screening, for in most parts of this deposit the silt content is very low.

All the motors on the plant are of Allis-Chalmers make and they are distributed as follows:

On scalping screen and belts from hopper 50 hp.; for return belt, 48 ft. centers, 5 hp.; for main conveyor, 40 hp.; for No. 4 and No. 5 crushers, 40 hp. each; for washing screens, 25 hp. each; for sand boxes, 20 hp.; for storage belt, 160 ft. centers, 10 hp.; for pump, 60 hp., and for the machine shop 5 hp. All these run at 1200 r.p.m. except the pump motor, which runs at 1800 r.p.m. The a.c.-d.c. motor-generator set on the electric shovel is 75 hp.

The present production of the plant is about 60 cars per day. Much of the output is shipped to highway work.

The offices of the J. E. Carroll Sand Co. are in the White building, Buffalo, N. Y. J. E. Carroll, who is well known in the industry from his long connection with the National Sand and Gravel Association, is president. Operations at the plant are in charge of H. W. Vickery.

J. E. Carroll

Bureau of Mines Investigates Screen Sizing

AN investigation of the screen sizing has been completed by the Bureau of Mines, Department of Commerce, in co-operation with the Illinois State Geological Survey and the Engineering Experiment Station of the University of Illinois.

Sizing is an important operation in every mineral-preparing plant for reducing the product to a form more convenient for utilization than that in which it was mined, the bureau points out in a recently issued bulletin containing the results of the investigation. No crushing machine will produce a finished product cheaply and continuously unless screens are used.

A perfect screen has never been invented, the bureau declares. Such a screen should segregate 100% of the small material without abrasion, require minimum power, be cheap in cost and durable in construction and necessitate a minimum charge for upkeep.

The theory of screening or the separation of mixed material of a wide range of sizes into divisions, the individual pieces of which range between maximum and minimum diameters, is at first thought simple, depending on the obvious facts that an individual particle will drop through a hole larger than itself and will not pass through a hole smaller than its least dimension. When the commercial application of these principles is attempted, however, numerous complicating factors are introduced. These include the shape of the particles, the proportions of coarse and fine materials, amount of moisture in material, shape of meshes or apertures, slope of screen, velocity of material passing over screens, coefficient of friction between screening surface and material screened, motion of the screen and the temperature of moving particles and screen surface.

Among the many designs for screens, four general types are recognized. These are stationary gravity screens, called grizzlies; revolving screens, or trommels; shaking screens riddles, and vibrating or pulsating screens.

Screen apertures have no maximum limit of size, but the minimum size of hole is ordinarily about ½ in. for ordinary gravity screens and 25-mesh for revolving screens run wet and for shaking screens. Vibrating screens and belt screens often size successfully to 100-mesh or even finer.

Copies of bulletin 234, by E. A. Holbrook and Thomas Fraser, containing detailed results of this investigation, may be obtained from the Bureau of Mines, Department of Commerce, Washington, D. C.

Fredonia Cement Plant Sold

THE Fredonia Portland Cement Co., Fredonia, Kan., has been sold by F. H. Patterson, president and general manager, to W. D. Pratt, of Fredonia and Kansas City, according to the *Kansas City (Mo.) Times*.

Mr. Pratt will become president and associated with him will be Stanley Stewart, vice president; Governor Ben S. Paulsen, treasurer; and O. P. Allee, secretary.

The plant has a capacity of 2,000 bbl.

Constitution and Burning of Artifical Portland Cement*

Part X. A Second Study of the Hydraulic Cementing Materials Other Than Artificial Cement—Causes of Defection of Mortars†

By J. E. Duchez, Engineer
(W'hur-Zurich, '06)
Authorized Translation from the French Revue des Materiaux de Construction
by C. S. Darling

[In the preceding part of this series which appeared in the July 25 issue, the discussion of the causes of disintegration of cements was continued and deductions made as to the possible compounds formed in the setting process, after observing the effect of additions of lime and calcium sulphate. The cements under consideration are artificial portland, quick-setting natural, and *ciment fondu*. The first two were discussed in the previous installment and the third case is considered herewith.]

3. *Ciment Fondu (Fused Cement)*

The chemical composition of the cement is:

$SiO_2 = 10.51\%$ $Fe_2O_3 = 8.52\%$
$Al_2O_3 = 39.84\%$ $CaO = 42.03\%$

In these cements the silicate is in the form $SiO_2 . 2CaO$. The quantity of lime combined with the silicate is:

$$10.51 \times 1.866 = 19.61\%.$$

Therefore there remains free for the alumina:

$$42.03 - 19.61 = 22.42\%$$

The alumina content being 39.84%, its transformation into tri-calcic aluminate will require:

$$39.84 \times 1.647 = 65.62\% \text{ CaO}.$$

There is, therefore, a lack of lime which will be:

$$65.62 - 22.42 = 43.20\%.$$

In order to supply this lime in the form of gypsum it would be necessary to add:

$$43.20 \times 1.428 + 43.20 = 104.89 \text{ } SO_3CaO.$$

The quantity of tri-calcic aluminate formed is therefore:

$$39.84 + 65.62 = 105.46$$

requiring for its transformation into sulpho aluminate of Candlot:

$$105.46 \times 1.51 = 169.16 \text{ } SO_3CaO.$$

It follows, therefore, that the *ciment fondu* would have been able to absorb:

$$169.16 + 104.89 = 274.07 \text{ } SO_3CaO$$

while the addition possible appears to be 30% without the cement disintegrating after 48 hours in hot water.

It can be stated, therefore, that the relation of the gypsum permissible, in relation to the quantities giving this sulpho aluminate, is

$$\frac{30}{274.07} = \frac{1}{9} \text{ of the total.}$$

It seems to follow from the above, that the quantity of gypsum which a cement can support without injury is between 1/8 and 1/10 of the total quantity which should be allowed for the formation of Candlot's sulpho aluminate:

$$(Al_2O_33CaO) . 3(SO_3CaO) . 30 \text{ } H_2O.$$

This leads us to believe, as M. Le Chatelier has noted, that possibly other sulpho aluminates exist which are less basic than that of Michaelis, Deval and Candlot.

If we establish the probable formula of the sulpho aluminate which appears to be formed in the above experiment, as stable sulpho aluminate, we arrive at the following results:

The sulpho aluminate of Candlot indicates a content (Al_2O_33CaO) in $3(SO_3CaO)$, this quantity enters therefore in the compound (Al_2O_33CaO) $3(SO_3CaO)$ having a combining weight of 408 and as we have been able to add only 1/8 to 1/10 of the total, the combining weight of SO_3CaO entering the sulpho aluminate formed would be

$$\frac{408}{8} = 51 \text{ or } \frac{408}{10} = 40.8$$

or an average of about 46.

The proportion of gypsum entering the formula would therefore be:

$$\frac{46}{136} = 0.34 \text{ or approximately 1/3, and the}$$

formula of the stable sulpho aluminate would be:

$$(Al_2O_3 . 3CaO) \text{ } 1/3 \text{ } (SO_3CaO)$$

or a percentage composition of:

Al_2O_3=34.88% CaO=64.95% SO_3=0.88%

while M. Candlot has given as the percentage composition of the anhydrous compound:

Al_2O_3=17.0% CaO=50.9% SO_3=32.0%

and for the molecular formula:

$$(Al_2O_33CaO)2\tfrac{1}{2}(SO_3CaO)$$

Dr. Michaelis and M. Deval have given to it the formula:

$$(Al_2O_33CaO)3(SO_3CaO)$$

In his book "Ciments et chaux Hydrauliques" M. Candlot writes:

"We have succeeded in obtaining this crystallized compound by mixing a saturated solution of sulphate of lime with a similarly saturated solution of aluminate of lime.

"At the end of a few hours the walls of the bottle are coated with crystals grouped in spherolites. On adding to the liquid a certain quantity of lime water, an abundant flocculent precipitate is formed in a short time. This precipitate, etc. . . ."

M. Candlot then determines the chemical composition of the precipitate and arrives at the formula $(Al_2O_33CaO)2\frac{1}{2}(SO_3CaO)$, which he calls sulpho aluminate of lime and to the formation of which he attributes the phenomena of setting and hardening noted when gypsum is added to cements.

In the method of the preparation of the compound, M. Candlot at first mixes sulphate of lime and aluminate of lime. He notes the formation of crystals grouped in spherolites.

We should note that this grouping of crystals in spherolites is found also in the crystallization of the aluminates of lime; that is to say, without any sulphuric acid being present, they are found in the crystallization of sulphate of lime and in the crystallization of alum plasters. It is not surprising, therefore, to find them in this experiment, but they may be formed by crystallization of tri-calcic aluminate alone, of gypsum alone, or of sulpho aluminate of lime.

In any case the solution includes aluminate of lime and sulphate of lime, and it is in the precipitate $(Al_2O_33CaO)2\frac{1}{2}(SO_3CaO)$ is formed in a short time.

However, a few lines after the quotation noted above, M. Candlot writes:

"If we mix with aluminate of lime, some sulphate of lime and some free lime, it results that the combination of sulphate of lime with the aluminate can only be produced slowly because the aluminate cannot hydrate as a consequence of the immediate solution of the lime."

Experience contradicts this explanation.

On the contrary experience seems to agree with the experiment of the additions of lime and gypsum which we have noted for the fused cement.

If the aluminate in solution in the experiment of M. Candlot was an aluminate less basic than 3CaO, there would be no means

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 †The *Revue des Materiaux de Construction*, August, September, October, November, 1924.

of explaining the formation of the crystals grouped in spherolites except by the formation of a hydrated tricalcic aluminate or the combination of the aluminate with the sulphate of lime. These compounds depending only on the quantity of aluminates and sulphates in solution, and the basicity of the aluminate, the reaction is produced as follows:

$$Al_2O_3CaO + 2(SO_3CaO) + aq$$
$$= Al_2O_33CaO\ aq + 2(SO_3H_2O)$$

The lime of the plaster is absorbed by the aluminate at least so far as the formation of the tricalcic aluminate, and as much more rapidly as the aluminate is less basic. If the quantity of gypsum in solution is insufficient, for example, $Al_2O_3CaO + SO_3CaO + aq$, the reaction will necessarily be produced as follows:

1. There will be a combination of CaO of the gypsum to form a certain quantity of tricalcic aluminate corresponding to $2/3(Al_2O_3\ 3CaO)aq$;
2. There will be a liberation of alumina hydrate for a quantity equal to $1/3\ Al_2O_3\ aq$;
3. There will be a liberation of SO_3 which, in the presence of water, will immediately be transformed into H_2SO_4.

If we add lime water in the solution this lime will be absorbed at the same time by $1/3\ Al_2O_3$ aq and by H_2SO_4 to complete the saturation of $1/3Al_2O_3.3CaO$ and SO_3CaO. The solution can, therefore, absorb two molecules, and the reaction will become:

$$Al_2O_3CaO + SO_3CaO + aq = 2/3\ (Al_2O_33CaO)\ aq + 1/3\ Al_2O_3\ aq + H_2SO_4$$
$$2/3\,(Al_2O_33CaO)\,aq + 1/3\,(Al_2O_3aq) + H_2SO_4 + 2CaO + aq =$$
$$\underbrace{2/3\ (Al_2O_33CaO)\ aq}_{(1)} + \underbrace{1/3\ (Al_2O_33CaO)\ aq}_{(2)} + \underbrace{SO_3CaO\ aq}_{(3)}$$

The setting in the reaction (1) is quite rapid and it is probably this which gives place to the crystallization in spherolites.

The reaction (2) and (3) are produced only through a new addition of CaO and it may be that (2) absorbs from (3) the quantity of SO_3CaO necessary to form the sulpho aluminate and even that (1) is still in a state of imperfect crystallization permitting the absorption of a certain quantity of SO_3CaO from (3).

From this remark, it follows that, according to the quantities of gypsum, aluminate and lime mixed, at the moment of the addition of lime, precipitates of aluminate of lime, of sulpho aluminate of lime, and of sulphate of lime may be formed. The experiment of M. Candlot may well have given place to precipitations of this sort and the weighable quantities of alumina, lime and sulphuric acid, determined from the precipitate, correspond only to those which have been able to react to form a mixture and not a definite compound.

Therefore, it is not to be wondered at that there is a difference between the formulas:

$$(Al_2O_33CaO)\ 1/3\ (SO_3CaO)$$
and
$$Al_2O_33CaO\ 3(SO_3CaO).$$

In any event the preceding experiments show that the cements are still stable when in the neighborhood of $(Al_2O_33CaO)\ 1/3\ (SO_3CaO)$, that they are unstable for slightly increased additions of gypsum, and that there is never a possibility of reaching or even approaching $(Al_2O_33CaO)3(SO_3CaO)$ to obtain unstable products.

There is therefore reason to believe that the result has indeed occurred as we have indicated in the experiments of M. Candlot and that the system $(Al_2O_33CaO)3(SO_3CaO)$ does not correspond to a definite compound, but to a mixture of aluminate of lime, of sulpho aluminate and sulphate of lime.

M. Deval has duplicated the experiments of M. Candlot and finds himself confronted with a fact which he has not explained: the weight of the sulphuric acid which has been combined exceeds that corresponding to the sulpho aluminate.

In our opinion the explanation is as follows:

The hydration of aluminates of lime is accomplished in two steps:

$$Al_2O_33CaO + aq =$$
$$\text{1st step: } Al_2O_33H_2O + 3CaO(H_2O) + aq =$$
$$\text{2nd step: } Al_2O_33CaO\ 12\ H_2O$$

This fact alone explains the setting of the aluminate less basic than 3CaO.

$$n(Al_2O_3CaO) + aq =$$
$$\text{1st step: } n\ (Al_2O_33H_2O) + n\,[CaO(H_2O)] =$$
$$\text{2nd step: } \frac{n}{3}\ (Al_2O_33CaO12H_2O)$$
$$+ \frac{2n}{3}\ (Al_2O_33H_2O)$$

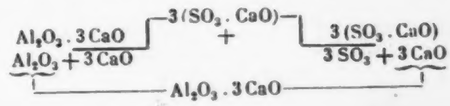
for which the first step is indispensable: without it the crystallization would take place in some other form than $Al_2O_33CaO\ 12\ H_2O$.

If in the first step we add calcium sulphate, it is certain that the hydrated alumina of the second step, $\frac{2n}{3}$ $(Al_2O_33H_2O)$ will not be able to remain free; it will borrow lime from the sulphate of lime and consequently will require $2n(SO_3CaO)$ to combine as a tricalcic aluminate.

$$\frac{2n}{3}(Al_2O_33H_2O) + 2n(SO_3CaO) + aq =$$
$$\frac{2n}{3}\ (Al_2O_33CaO)\ aq + 2n\ (H_2SO_4)$$

and this mixture may still combine with sulphate of lime to be transformed into sulpho aluminate and if we designate this necessary quantity as $x(SO_3CaO)$ then that which is combined will be $(x + 2n)$ (SO_3CaO), and therfore greater by 2n than that necessary to the formation of the sulpho aluminate. If there is not an excess of lime, the sulphuric acid remains in solution in the excess of water, but if there is an excess of lime or if lime is added there will necessarily be precipitated sulphate of lime which crystallizes with the aluminate or the sulpho aluminate.

It is understandable that if, after the first step of hydration, the hydrate of alumina has a greater affinity for the calcium sulphate than for the lime, even that being liberated from the aluminate, the reaction is as follows:



The lime of the calcium sulphate is substituted for that of the aluminate and the reaction can be complete only if each of the acid radical is with three molecules of combinable bases. As the substitutions are made in the proportion of the formation in the first step of hydration of the aluminate, the mixture is perfect and we could arrive at no other formula than $Al_2O_33CaO + 3(SO_3CaO)$ the excess of the calcium sulphate subsequently disappears by washing.

There is, therefore, nothing astonishing in the fact that the quantity of combined sulphate is in excess to that corresponding to the formula $(Al_2O_33CaO)3(SO_3CaO)$, for in fact the formula of the mixture ought to be: $(Al_2O_33CaO)\ 1/3\ (SO_3CaO) + 3(SO_3CaO)$.

(To be continued)

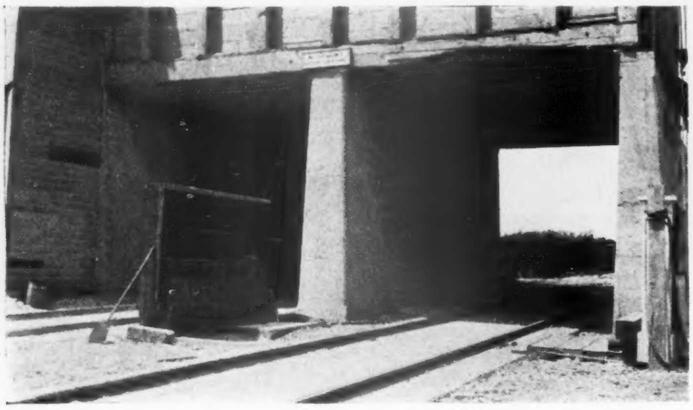
Effect of Powdered Admixtures in Concrete

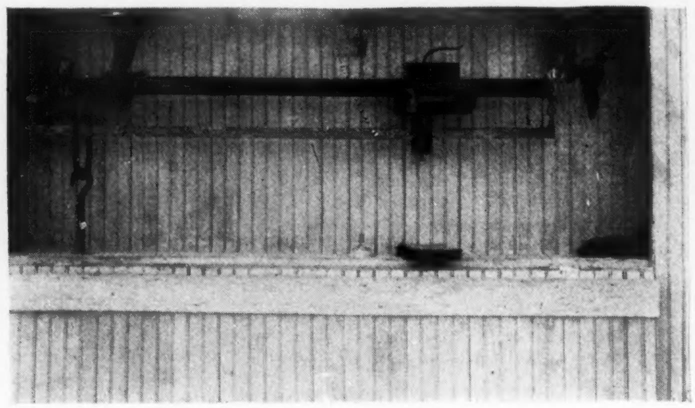
A SECOND EDITION of bulletin 8, "Effect of Hydrated Lime and Other Powdered Admixtures in Concrete," Prof. Duff A. Abrams of the Structural Materials Research Laboratory, Lewis Institute, Chicago, is off the press. The paper was originally published in the proceedings of the A. S. T. M., 1920. Tables and diagrams have been revised to include two and five-year tests.

This investigation was confined to powdered admixtures which are essentially inert in the presence of water and portland cement, as contrasted with liquids or soluble materials. Most of the tests were made with hydrated lime, but 17 other powders were also used. The effect was studied of admixtures up to 50% of the volume of cement on the compressive and tensile strength, wear, bond and workability of concrete made with sand and pebbles and crushed limestone aggregate of different sizes and gradings in mixes ranging from 1:2 to 1:9, and a wide range in consistencies. Seven different investigations were made, including more than 20,000 tests at ages of three days to five years.

Admixtures of powdered clay brick, clay, whiting, sand, natural cement, limestone, lava, fluorspar, kaolin, Kieselguhr, tufa, hydrated lime, ironite, yellow ochre, mica, pitch and gypsum to 1:4 concrete were made and tested at 28 days, effects compared and conclusions drawn.

Hints and Helps for Superintendents





These show the electrical connections by which the bell is rung when the car is full

Bin Discharge Regulating Device

AT many plants where track scales are located underneath loading hoppers, it is necessary to have one attendant at the scales and one at the loading hoppers, so that they will know when the required amount of stone has been put in the car which is being weighed.

The Iowa Limestone Co. of Alden, Iowa, has made a very simple electrical arrangement, in connection with the beam of the track scale, that automatically informs the attendant at the bins when the required amount of stone has been put in the car. This consists of a short section of copper wire placed just above the end of the beam, which is connected in circuit with a dry battery and the beam of the track scale. The scale is set at a predetermined weight and when that weight is reached the beam goes up, making contact with the copper, which automatically starts a bell to ringing. The operator then knows that it is time to shut the bin gates.

Storage for Gasoline

AT plants where gasoline is used for operation of shovels and locomotives there is often no place where it can be stored with comparatively safety and drawn out with ease.

The Iowa Limestone Co. of Alden, Iowa, has found that installing an automatic pump, such as is used in filling stations, is a great economy. It makes it possible for them to store their gasoline and to draw it out filtered and at the same time keep a complete check on just how much gasoline is used. This is a great improvement over buying gasoline in drums and having no check on what is used, and at the same time exposing it to the danger of the elements.

Many other plants have installed equipment of this kind, although not all of it is as elaborate or as carefully housed as the installation shown. If for no other reason the cost of such an installation is justified by the saving in gasoline from spilling and evaporation.

A neat arrangement for storing gasoline

Design of Crusher Feed Gate

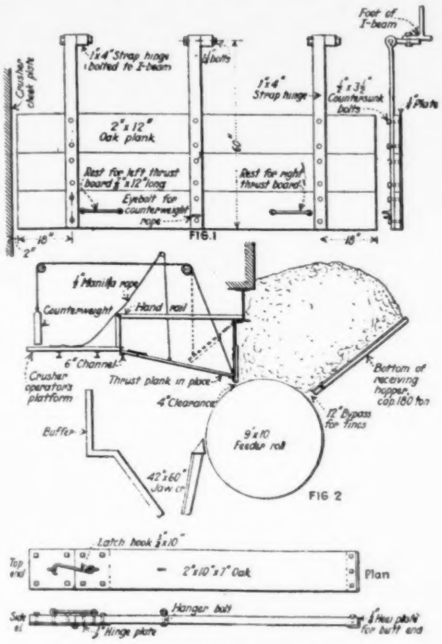
By H. H. Hummer

(Engineering and Mining Journal-Press)

THE gate shown in the accompanying illustrations was designed for the open-pit primary crusher plant at the Cornwall mines at Cornwall, Pa., in which a 42x60-in. jaw crusher is served by a 9x10-ft. roll feeder. Like many other plants using big crushers, no provision had been made to utilize the storage capacity of the receiving hopper above the crusher at times when the crusher was clogged up. With the receiving hopper half full or more, and the 5-ft. clearance above the roll feeder entirely filled, no additional cars could be dumped into the hopper while the crusher was blocked, without endangering another slide of material into the crusher, thus causing further delay in clearing it. The vibration in the crusher building would frequently start a fresh slide when the crusher men were clearing a clog-up, and as a consequence they had to be on the alert to avoid being caught. To save time and work effectively, they would often take chances in placing the 5-ton air lift hook used in clearing the crusher. As the crusher could not be started under load, the hopper had to be cleaned down at the close of a shift, for fear of a slide starting between shifts. The hopper was thus of no use as a stor-

age on shifts when the crusher was not working. In the rush seasons one shovel would be operated second shift to load all empty cars and the hopper storage would have been advantageous.

To avoid all train delay at the crusher due to clog-ups, and as a safety measure for the crusher men, the gate shown in Fig. 1 was designed. As ore falling from a car into the empty hopper slid about 30 ft. on a 45-deg. slope, rail lined (see Fig. 2), a considerable portion would gush out over the hump of the roll, and strike



Section and details of crusher feed gate

the buffer before falling into the crusher. In handling chunks that weighed 5 to 6 tons, the gate would thus have to withstand severe shocks. The gate was designed principally to stop the first rush of ore, mostly fines and medium-sized chunks. As these built up back of the gate, the impact of the big chunks that followed would be taken up. Clearance for using the 5-ton air lift, which was kept on the right-hand side of the crusher when not in use, had to be provided. The gate could thus only be propped on the left side, except between shifts, when two thrust planks were used.

In the closed position, the gate has about 4-in. clearance at the bottom and 2-in. at the ends. This allows the first rush of fines to slide under and around, and gradually stop, building up behind the gate. One thrust plank held the left side of the gate in place, the thrust plank buckling more or less and the operators' platform springing also. The right-hand side would move outward 4 to 6 in., warping the entire gate as the full impact of the slide of rock was checked.

To save the gate as much wear as possible when not in use, it was swung to a 50-deg. slope by a counterweight suspended by a ⅝-in. wire rope. Only the very large chunks would strike the gate in this position, and the counterweight would aid in clearing the gate and in relieving the shock of flying chunks. It was found that the gate was also of assistance in turning long slabby chunks that formerly slid down and bridged the crusher jaws. The gate was heavy enough to deflect the long slabs into the jaws.

The gate was closed whenever a clog-up took place and a train had to be dumped, or for safety in working over the crusher. The operator places the butt end of the thrust plank on top of the left cross-piece on the gate, and placing his foot against the top end, shoves the plank over the edge of the platform, where it is caught in the 6-in. channel. This requires only a few seconds and the air signal is then blown to dump. On clearing the clog-up, the latch on the upper side of thrust plank is knocked open and a slight pinch with a bar under the hinge is sufficient to spring the plank and release the gate. A ½-in. manila rope passing over a pulley above the crusher to the operator's platform is used to recover the plank (see Fig. 3).

The arrangement, although rather crude, worked very well and required little repair. I do not believe air-plunger operation of the gate would have been successful, as any resistance to the impact of occasional big chunks would have required constant repairs. Flying chunks resulting from blasting in the crusher would have made a target of any mechanical device. The thrust plank was cut out about every three or four months by blasting.

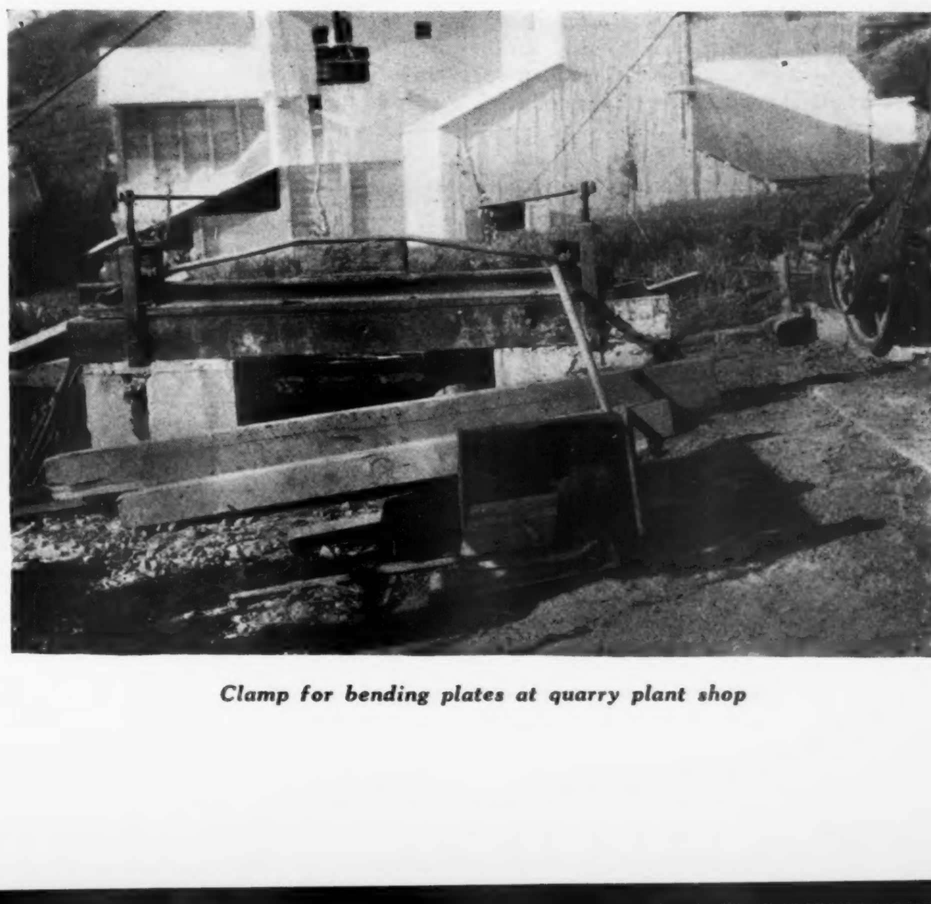
The 2-ft. clearance above the gate gave the feeder-roll operator a good view of the ore passing over the roll, and allowed the escape of powder gases and small chunks of ore when blasting a block up over the roll. The gate also gave a good support for a 10-in. plank slid out from the operators' platform when drilling a big chunk or placing powder for a chamber shot over the roll, and made it possible to examine the clog-up in safety.

During two years' operation, repairs consisted of a half dozen or more broken hinges which were welded, and a new 2x2-in. bottom plank. The constant twisting of the hinges would cause them to fail about half way between the hangers and the top of the gate. A new hinge could be put in during the half-hour lunch period. An occasional blast over the roll close to the hinge would cause it to snap. The crusher gate practically eliminated all train delay at the crusher, and minimized the accident risk. It added 200 tons storage capacity to the empty car service when the crusher was down for repairs, or on those shifts when the crusher was not working.

Clamp for Bending Plates

By J. R. Thoenen

THE usual quarry blacksmith has few facilities for bending heavy plates such as are used in making repairs to cars or chute linings, etc. In the accompanying picture is shown a simple home-made clamp which any handy blacksmith can duplicate. It consists of a heavy piece of square steel placed on two concrete piers as an anvil. On this is placed a heavy piece of rail for the upper jaw of the clamp. The rail is supported in the center by a truss rod and block to equalize the pressure over the entire length of the jaw. Discarded drill column jack screws with home-made straps at each end clamp the rail in place over the edge of the anvil. The plate to be bent having been clamped in place, the blacksmith's helper does the rest with a sledge.



Clamp for bending plates at quarry plant shop

Making Quick-Hardening Concrete of Standard Portland Cement

Method Adopted by the Indiana State Highway Commission for Making Repairs That Can Be Open to Traffic in Two Days

AN editorial note in ROCK PRODUCTS brought forth a number of inquiries as to how standard portland cement concrete could be made to harden sufficiently to sustain heavy traffic in two days. Accordingly A. H. Hinkle, of the Indiana State Highway Commission, division of maintenance, who developed the method, was asked for information concerning it. Mr. Hinkle forwarded his instructions to highway workers, explaining the method from which the following is abstracted. The first part of the report dealing with the preparation of the old concrete is omitted.

"The quick hardening concrete will depend for its early strength upon: (1) Richness of the mix; (2) freedom from excess water; (3) use of $CaCl_2$; (4) comparatively high atmospheric temperatures; (5) coarse sand and properly graded sand and coarse aggregate, and (6) time of mix. All of the above factors affect the time of hardening of the concrete mix. If we combine the most favorable features of all the above factors in one mix, we can make a concrete which assumes as much strength in two or three days as the ordinary concrete mix used in paving assumes in 21 days.

"*Cement* should be tested at the laboratory and a report secured so as to know that it passes the required test. It is imperative that the cement is of good quality. Old cement that has lain around in a damp place until it has partly caked should not be used for this most important work. Some brands of cement attain greater strength than others at an early date. It is desirable to use such cement for repair purposes if it can be conveniently secured.

Aggregates Must Be Clean

"*Sand* should be a comparatively coarse sand, 95% of which passes ¼-in. mesh screen. It should be clean and free from silt or foreign material. The sand grains should be composed of hard, gritty material and be what is ordinarily known as a 'sharp' sand. Any amount of *shale in the sand* is detrimental to it and may cause failure of the concrete.

"*Coarse aggregate* should be crushed stone or gravel fairly *well graded* from ½ to 2½-in in size. If the concrete is to be used to fill a crack of very small opening, the maximum size of aggregate will be reduced accordingly. It is imperative that this coarse aggregate be clean and free from pieces of wood, dirt, silt, *shale* or any soft particles. *Rock of shale formation, although apparently hard and sound when first quarried*, will cause failure of the concrete even though found in comparatively small quantities in the concrete.

"*Calcium chloride* ($CaCl_2$) is furnished in 100 lb. bags, which must be kept closed, as the exposure of the calcium chloride to the air will permit it to absorb moisture from the air and enter solution. It is quite imperative that the exact quantity of this material be used in each batch. An excess will weaken the concrete and insufficient calcium chloride will not hasten the time of setting to prevent the pavement from being injured by traffic when opened after the number of days given in the table. The calcium chloride must not be added directly to the drum, as small undissolved particles remaining in the concrete will cause the concrete to disintegrate. The calcium chloride shall be added in the form of a 'standard solution' made by thoroughly dissolving 1 lb. of commercial calcium chloride in enough water to produce one quart of of solution. (This is at the rate of about 2½ quarts of the $CaCl_2$ to one gallon of water.) This 'standard solution' should be placed in a keg, jar or barrel and labeled 'standard solution.' Two quarts of the solution for each bag of cement should be added to the mixing water just before it is put into the drum.

"*Water* must be pure and free from vegetable acids. The amount of water will have to vary so as to make the concrete of the proper consistency. In practice this will usually be found to vary from 2 to 5 gallons of water per sack of cement. However, when all the aggregates are thoroughly saturated with water after a rain it may be found that the two quarts of 'standard solution' will be sufficient water to make the required consistency. It should be remembered that excess water will reduce the strength of the concrete and delay the hardening process and not only permanently weaken the concrete but also lengthen the time traffic will have to be kept off the patch. In order to secure the quick hardening effect, the concrete will have to be a sufficiently dry mix, that it will show no more than the slump given in Table I. (See description of slump test in footnote after

TABLE I. SHOWING THE MIX OR PROPORTIONS OF MATERIALS TO USE TO SECURE CONCRETE THAT CAN BE OPENED TO TRAFFIC AFTER ANY NUMBER OF DAYS

	PROPORTIONS						
Days Patch Closed to Traffic	Bags of Cement	Cu. Ft. of Sand (0-¼")	Cu. Ft. of Coarse Aggregate (½"-2½")	Lbs. $CaCl_2$ or Qts. of "Standard Solution"	No $CaCl_2$ Water, Add enough to produce Slump given below	Bags of Cement per Cu. Yd. of Concrete	Remarks (8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	This mixture to be used for small patches that are to be opened to traffic at the earliest date possible. Atmospheric temperature should average about 60° F.
2	1	0.5	1.9	2	1"	11.8	
3	1	0.6	2.1	2	1"	11.2	
5	1	1.0	2.7	2	1½"	8.4	
12	1	1.3	3.0	2	1½"	7.6	
15	1	2.0	3.0	2	1½"	6.8	
21	1	2.0	3.0	No $CaCl_2$	2½"	6.8	Standard mix to be used where closing road to traffic is not an important item and where large areas are to be patched

(5) This "Standard Solution" is made by dissolving commercial $CaCl_2$ in water at the rate of one (1) pound to enough water to produce one (1) quart of solution. The pure $CaCl_2$ should never be added direct to the drum of the mixer. The "Standard Solution" should be added to the water just before it is put into the drum. See instructions under Calcium Chloride.

(6) Standard Slump Test. Fill with concrete a metal form shaped as a frustum of a cone. Form should be 12 in. high with a 4-in. top diameter and 8-in. base diameter. Set the form on a level surface and as the concrete is put in the form, tamp lightly with a rod until a slight film of mortar appears on the surface. Then remove the form and immediately note the settlement or slump of the concrete which is a measure of its consistency.

Table I.) Great emphasis should be placed on the importance of guarding against using *too much water*. The use of 3 or 4 pints more water than is necessary in a one sack batch will reduce the strength of the concrete more than it can be increased by extending the time of mix. Hence, while it is necessary to use enough water so as to make a concrete plastic enough that it can be worked and properly finished, *guard against using too much water*.

"Only *machine mixed* concrete should be used. It is almost impossible to get a maximum strength concrete, which is very imperative in repair work, if one depends on hand mixing. The usual time specified for mixing ordinary concrete in a mixer is one minute. However, tests show that the *strength* of a *dry mix* may be increased as much as 10% by mixing 1½ minutes, instead of 1 minute, and the strength is slightly increased by extending the time to 5 or 10 minutes. Hence, in repair work and where a smaller mixer is used, which will generally be less efficient than the big paving mixer, and where a dry mix is required for a maximum strength, quick-hardening concrete the time for mixing might well be placed at not less than *two minutes*. This increased time of mixing will also make the finishing easier.

Placing and Finishing Concrete

"Concrete should be shoveled in place and *thoroughly tamped* in layers not exceeding 3 in. in depth. The secret of the early strength of the concrete will largely lie in a *comparatively dry mix hammered in place*. A 10-lb. concrete tamper can be used for much of this work. A thin edged tamper having a face, say, 1x6 in., should be available for tamping in narrow openings and along the edge underneath the old slab."

Special Privileges for New Cement Plants in Brazil

A Case of Government Assistance But of May Be a Little Too Much Government

FOR the purpose of encouraging the erection of cement plants in Brazil which shall employ domestic raw materials and fuel, the president on December 31, 1924, signed the following decree published in the *Official Gazette* on January 22, 1925:

The president of the United States of Brazil, using the authority given him by Art. 175 No. IX of Law No. 4793, of January 7, 1924, decrees:

"ART. I—The following concessions shall be granted to all companies legally organized in Brazil for the manufacture of cement, provided that they utilize domestic raw materials and fuel, and produce a minimum of 25,000 tons annually.

"I. Exemption from import duties and clearance taxes for 20 years on the following:

(a) Machinery, equipment and material destined for the installation and improvement of the cement factories.

(b) Machinery, equipment and material destined for the production and transmission of electric power to be used in the cement factories.

(c) Machinery, equipment and tools to be used in the mining of the raw materials (lime and cement rock).

(d) Machinery and materials required for the construction of short railway lines, aerial cables, or other means of transportation necessary for the supplying of the factory and the distribution of the finished product.

(e) Equipment, instruments and materials destined for chemical and physical laboratories indispensable to the work of the factories.

"II. Exemption, for 20 years, from all federal taxes which may be imposed on the construction and functioning of the factories and their dependancies.

"III. The right of condemnation, according to existing legislation, of lands required for the construction of short railway lines, aerial cables, and electric power transmission lines destined for the service of the factory. All plans for such construction must be submitted to the government for approval.

"IV. Reduced freight rates for 10 years, on government railway and steamship lines, on:

(a) Machinery and material enumerated in No. I of this article.

(b) National coal; domestic lime; and lumber found in the country suitable for the manufacture of barrels.

(c) The export product, either in clinkers or packed in sacks or barrels.

"ART. 2. The corporations or companies desiring to benefit by these concessions must obligate themselves as follows:

(a) Subject themselves to government inspection, and allow inspectors to visit all parts of the establishments, furnishing them with such information and explanations as may be requested as well as an annual report concerning the works under construction, production of the factory, and financial condition of the company.

(b) Deposit in the national treasury an annual quota of $12,000 for inspection expenses, and a bond of $100,000 before signing the contract.

(c) Present for the approval of the government all plans, estimates and specifications for the installation of the factories, as well as for all substantial alterations or new processes to be installed. These shall be considered as approved if they have not been contested within 60 days after presentation.

(d) Employ at least 50% Brazilian laborers.

(e) Maintain 10 minor apprentices in the factories and employ in accessory operations three engineers who have concluded industrial courses in the Escola Polytechnica or the Escola de Minas, in accordance with the indications of the Minister of Agriculture, Industry and Commerce, for a term of two years and at a minimum monthly salary of $500.

(f) Sell to the goverment, for its requirements, at least 30% of the annual production of the factories at a lower price than the c.i.f. cost of similar imported material plus customs handling and dock charges at Rio de Janeiro. The difference in price shall be adjusted at the time of the purchase.

(g) Prove that the company owns good cement rock and lime deposits suitable for making cement and able to supply the factory for 20 years an at annual production of 25,000 tons.

(h) Not market the cement before obtaining permission from the inspector, who shall certify to its composition, quality, density, degree of pulverization, resistance, and the effect of heat or cold on the product, which certificate must accompany all cement sold.

"ART. 3. The exemption from customs duties and clearance taxes mentioned in Article I, will be granted only in case no similar products are manufactured within the country. The reduced freight rates, men-

tioned in the same article, must not be inferior to the actual cost of transportation.

"ART. 4. The government may concede the use of hydraulic power on public land for the development of the cement industry, provided it is not needed for federal services.

"ART. 5. The government may assist the development of the cement industry by constructing short railway lines to transport raw materials, fuel and the finished product.

"ART. 6. The federal government will use its good offices to secure for the concessionaires exemption from state and municipal taxes which may be levied on factories and their dependencies, and on the transportation of raw materials, fuel, and the finished product.

"ART. 7. In case the factories are established on the sea coast the government will give preference to them in leasing marine lands deemed necessary in the construction and services of the respective factories, with due regard, however, to the rights of third parties and the dispositions of existing laws.

"ART. 8. The concessionaires may exploit mines, mineral and refractory deposits, and quarries of the products used in the cement industry, in accordance with existing legislation.

"ART. 9. The concessionaires may also construct telephone and telegraph lines between their various holdings, upon permission being granted by the federal government and the government of the respective states.

"ART. 10. Loans and financial aid shall be granted only after the company or corporation owns sufficient property to guarantee their payment.

"ART. 11. The government may at any time requisition the plant and dependencies for the public good in case of war, in accordance with the laws of the country.

"ART. 12. The companies and corporations to whom these favors are granted must complete the installation of their plants within the time stipulated in their respective contracts, and keep them in perfect condition and continuous operation, under the penalty of having the contracts cancelled if the plants are idle for more than 90 consecutive days, excepting when so obliged by acts of God, recognized as such at the discretion of the government. In instances where the contract is cancelled under the conditions outlined above, the concessionaires are obliged to refund to the government the amounts of exemptions already granted.

"ART. 13. All dispositions to the contrary are hereby revoked."

The above is from a Department of Commerce report by E. R. Bradford, American Consul, Rio de Janeiro, Brazil.

Obtaining a Chemically Pure Magnesium Carbonate from Dolomite

TWO foreign inventors have developed and patented a process for the preparation of chemically pure magnesium carbonate from dolomite, which is described as follows (U. S. patent, June 2, 1925, No. 1,540,391):

This process is distinguished from the prior known processes, especially by the feature that the magnesium content of the minerals to be treated is obtained or recovered together with the alkali carbonate (ordinarily sodium carbonate) employed in the carrying out of the process from the reaction mixture in the form of a salt solution at the temperature employed, whilst the calcium content of the mixture remains behind insoluble in the solid residue at the same temperature.

The invention therefore may be described as a special method of separation, by means of which the magnesium can be entirely separated from the calcium.

A process is already known, whereby the magnesium is separated from the calcium of dolomite, as bicarbonate of magnesium. This prior process is based upon the fact that the calcium and the magnesium are soluble in water containing carbonic acid in different degree, but it possesses various drawbacks as follows:

(1) Carbonate of magnesium and carbonate of calcium are certainly soluble in water containing carbonic acid in different degrees. This distinguishing solubility can, however, not be employed, as a quantity of magnesium is dissolved out of the raw material.

All these drawbacks can be overcome by the application of the process forming the subject of the present application working with a solution of alkali metal bicarbonate saturated with carbonic acid.

The process is carried out as follows: Either the mineral itself containing the magnesium in the form of carbonate or the product thereof obtained by roasting are respectively finely ground and then mixed with alkali metal carbonates, or alkali metal bicarbonates, dissolved in water, saturated with carbon dioxide, with or without pressure and heated to a temperature of from 60 to 70 deg. C. By this means the magnesium carbonate forms in the water containing carbonic acid, soluble carbonic acid double salts in combination with the alkali metal carbonate or bicarbonate, whilst the calcium content of the mineral remains behind in the form of insoluble calcium carbonate. The solution containing the carbonic acid double salts is then decanted from the insoluble residue containing the calcium carbonate as well as the iron salts of the mineral and the silica and alumina separated by the carbonic acid, and is then heated for a prolonged period, to a temperature of 100 deg. C., whereby the carbonic acid double salt is broken up into soluble alkali metal carbonate and insoluble magnesium carbonate which precipitates from the solution. The alkali metal carbonate which remains in solution can be employed for the treatment of further quantities of mineral containing calcium and magnesium as well as the carbonic acid, if arrangements are made for the recovery thereof.

The cause of the chemcial decomposition occurring in this process can be explained as follows:

Whereas calcium bicarbonate decomposes at a temperature of from 60 to 70 deg. C. and precipitates as insoluble mono-calcic carbonate, magnesium-alkali metal carbonate is still soluble at this temperature. Further, the excess of sodium bicarbonate contained in the solution decomposes at this temperature into a sodium carbonate and carbonic acid and the sodium carbonate thus formed reacts upon the calcium carbonate, so that monocalcic carbonate and sodium bicarbonate are produced, and the latter forms with the $MgCO_3$ in solution containing carbonic acid, a soluble double salt as follows:

$$CaH_2(CO_3)_2+Na_2CO_3= CaCO_3+2NaHCO_3$$

and

$$2NaHCO_3+2MgCO_3= 2MgCO_3.NaHCO_3.$$

Furthermore, in this reaction Na_2CO_3 plays the part of a catalyzer, which very much assists the absorption and the reaction, that is to say, the transfer of the carbonic acid, whereby the formation of the magnesium solution and the extraction of the magnesium from the raw material is considerably quickened.

Finally, another advantageous action of the alkali metal carbonate is that the iron salts which would otherwise dissolve in the water containing carbonic acid together with the magnesium carbonate are precipitated by the use of alkali metal carbonate together with the calcium carbonate, and thus the obtaining of a chemically pure magnesium carbonate is rendered possible.

Another Use for Portland Cement

A PAINT consisting of portland cement and linseed oil plus tinting pigments to produce desired colors is now manufactured under the trade name of Tnemec paint by the Tnemec Paint and Oil Co., Kansas City, Mo. By a patented process as much as nine pounds of portland cement are held in practically permanent suspension in a gallon of paint. The oil used in the manufacture and for later thinning of the paint, to suit the application, must be pure boiled linseed. The paint is used for the preservation of steel, galvanized iron, stucco, concrete, brick and outdoor woodwork and has been approved by committees of architects and engineers.

Ganister, An Important Form of Silica

A Quartzite Which Is Quarried Extensively in Pennsylvania for Making Refractory Brick and for Silicon Alloys

By J. D. Hartman
(Of J. L. Hartman Co., Holidaysburg, Penn.)

GANISTER rock is a raw material quarried in Pennsylvania and used in a number of most highly developed and important industries of the state. The rock has a bright glassy lustre and exists in a variety of different colors, depending on the percentage of iron content. The predominant color, however is white, which is that of the best quality. "Ganister" is a commercial name, the rock being really an almost pure quartzite, with a silica content often exceeding 98%. The impurities—iron, alumina, magnesia, and lime, etc., exist in such small percentages as to be negligible, insofar as affecting the quality is concerned. It is a highly refractory material and apart from its expansion, it is not at all affected by temperatures ranging up to 3000 deg. F. The difference from the ordinary silica sand rock, is a physical one. Chemically, the analyses of the two are quite similar, but the molecular structure of ganister rock is such that it has the physical property of expanding and contracting without disintegrating, when subjected to gradual and varying temperatures which do not exceed 3000 deg.

The rock is one of the hardest found in the state and offers great resistance to crushing and grinding. Its occurrence, geologically, is in two different formations, the stratified and unstratified. In the stratified formations, the ledges are similar to limestone deposits, but in the unstratified, the rock occurs in large open and uncovered flows, lying on the crests and slopes of a range of mountains, paralleling the Alleghenies, and lying south of them. The largest and most important deposits of the mineral and the chief sources of supply are in Mifflin, Huntingdon, Blair and Bedford counties, Pennsylvania.

In these counties are located a great many silica brick manufacturing plants, some of which are the largest in existence. Other scattered plants, obtaining their ganister from the counties mentioned are located in western Pennsylvania, and eastern Ohio. The silica brick plants of Pennsylvania produce approximately 80% of the entire requirements of the United States. The rock is found in several other counties of the state, but the deposits are small and in most cases of inferior quality.

In making silica brick the raw rock is first crushed and then ground to about the size of sea sand. During the grinding, lime water is added which serves as a bond during the moulding and drying processes to which the green brick are subjected. When thoroughly dry, the brick are placed in large kilns. Burning requires from five to nine days. The kiln furnaces are carried at a very high temperature during the final period of burning, ranging from 2700 to 2900 deg. F. to obtain complete and thorough expansion of the brick. It takes about 21 days from the time the raw material enters the process until the finished brick are ready for shipment. The composition of a first quality silica-brick is 96% refractory silica, 2% of calcium oxide (lime), and the remaining percentage of the impurities found originally in the rock.

The manufacture of silica-brick in the United States had its beginning in the year 1884, when the A. J. Haws and Sons' Co. of Johnstown, Penn., produced the first silica brick made from ganister rock shipped from McKee, Blair county, by Jesse L. Hartman. The next company to make silica brick was the Harbison-Walker Company at Pittsburgh in 1886 from McKee rock. Prior to 1884, the requirements for silica brick were small for the reason that the open hearth process of making steel was in its infancy and not until many years later did it come into prominence as a better method than the Bessemer converter process. The importations of silica brick as the records show, were very small and ceased entirely in the year 1889 when the two American plants, the Haws and Harbison-Walker, were able to take care of all requirements, manufacturing silica brick of as good quality as the imported.

Canoe Mountain quarry of the J. L. Hartman Co. in "solid formation" of ganister rock near Hollidaysburg, Penn.

The principal and most important industries in which silica brick is the chief material used, is in the open hearth process of making steel and in byproduct

coke ovens. In both these industries, the importance of which to our present civilization can scarcely be overestimated as ganister rock may well be considered one of our most important raw materials, making it possible to construct and build steel furnaces and coke ovens capable of withstanding the great wearing action and the extreme temperature which obtains in both processes.

Another important field and one in which the raw rock is used without first making into brick, is the Bessemer process of making steel. Here the rock is ground and mixed with fire clay and the resultant plastic material is used to line the steel converter. The consumption in the past has been very large, but due to the rapid replacement of the Bessemer process of making steel by the open-hearth, the requirements in past years have been less than formerly.

The unprecedented development of the metallurgical industries in the United States, has brought about the manufacture of a great number of ferro alloys, two of which require a certain amount of ganister rock. Silica is found in a great variety of forms and compounds and widely distributed, but if its physical condition is not right, it is useless for many purposes. An example is glass sand which is identical in analysis with ganister rock but entirely unsuited for making these alloys as it is for the other cases to which the rock is put. One of these alloys, is ferro-silicon, in which the rock and steel are chemically combined by subjection to the temperatures of the electric furnace estimated at more than 6,000 deg. F. This high temperature in conection with the use of coke breaks down the silica rock and permits it complete fusion with the steel. The percentage may be 50% rock and 50% steel or any mixture ranging from this to 25% steel and 75% of rock. This ferro-silicon alloy has an important use in the open-hearth process in the capacity of a cleanser for the bath of molten steel, and by the introduction of a small amount the work is hastened and the finished steel is obtained more quickly.

Another important alloy is made from silicon metal, the largest percentage of which is made from ganister rock. Silicon metal when mixed with aluminum increases the strength of the aluminum many times without destroying to any appreciable extent its chief characteristic, lightness of weight.

Quarrying Ganister Rock at One of the Hartman Quarries

GANISTER, as Mr. Hartman tells in his article in this issue, is quarried from rock flows on the mountain side and from stratified beds. The products of these deposits are known respectively, as "flow-rock" and "formation rock." There are a number of ganister quarries along the Juniata river, some of them worked in connection with the large plants for making silica brick that one passes on the railroad that runs beside the river. Both "formation rock" and "flow rock" are quarried, the use of one or the other, or both together, seeming to be a matter of preference on the part of the silica brick makers. Each plant, the writer was told, has its own formulas and methods adapted to the kind of raw material it prefers.

The following notes were made during a visit to the Flowing Springs quarry of the J. L. Hartman Co., in which "flow rock" or surface rock is quarried. The company owns and operates both kinds of quarries, but work was going on only at the flow rock quarry at the time.

Surface rock quarrying is much easier than the other, because it does not require so much breaking. Drilling in quartzite is a hard job. Well drills have not been very successful in it, and tripod drills, putting in holes to suit the formation, are generally used. But in working the surface rock practically no drilling is needed. The larger pieces are broken up by sticks of dynamite laid on the rock and covered with damp earth (mud capping) and the smaller pieces are sledged to "one man stone" size. The deposit is not worked to any great depth, in fact the typical deposit has no depth as it is a slide or "floe" of loose pieces which covers the mountain side. These white floes are a common sight on the mountain sides through central Pennsylvania.

To get much rock from a shallow working requires a large area. The operations at the Flowing Springs quarry extend some two miles across the face of Lock Mountain, and at the Sproul quarry of the


Left—Where the permanent track and the temporary track are joined. Right—Where the quarry cars are unloaded into railroad cars

same company they are even more extensive. Consequently the successful working of such a quarry is largely a matter of transportation. The rock has to be gathered from all parts of this great area and brought down to the railroad at the bottom of the mountain over which it is to be shipped.

To do this a regular working system must be laid out and adhered to. The method followed is to bring a narrow gage track (36-in. in this case) almost to the top of the mountain by switchbacks and then to run a level track along the face. The rock above this level is broken up by mud capping and the pieces rolled down to the track level. Waste rock and big pieces may be used in building up the grade. The rest is hand sledged or mud capped so that it can be loaded on to cars.

Sledging the lumps of ganister rock that have been broken by "mud capping" and loading into cars. A fork is used for the fines to separate the dirt

Naturally the face has been cleared of trees, dirt, etc., before the actual quarrying begins. The little dirt that is left goes into the fines and is left behind by using a fork for loading the small pieces. Everything below 1-in. size slips between the tines of the fork, and this includes the dirt.

As the work proceeds other levels are pushed out so that work can go on at more than one level if this is necessary. Levels are abandoned as the ground above them is worked out and the rails are pulled up and placed on a lower level.

The switchback up Lock Mountain is at present 5½ miles long. The lower three miles are considered permanent track and are laid of heavy rails. The ties are cut from trees on the ground, the timber belonging to the company.

The grade runs between 3% and 4% with a strong tendency to the higher figure. Level stretches of track are put in every 3000 ft., the idea being that a runaway train might be caught and controlled at one of these, which might be done if the runaway did not occur too far from a level stretch.

Fifty-pound rail is used on this permanent track and 32-lb. rail on the more temporary track above. The train consists of a Porter 20-ton steam dinky and 12 6-ton cars of the company's own design and make.

Left—Type of car used. Note the quadrant brake on the end. Right—The mountain side after the ganister rock has been removed

Each car has its own brakes connected to a ratchet and quadrant arrangement at the end. These are hand set on the down trip.

To pull the 12 empties back is a task on such a grade and a lot of sand is needed. Both sand domes are filled and sometimes, when the rail is wet, this is not enough. Sand has also to be used on the down grade on the level places and at the switches.

Five trips are made each day with the two locomotives. A fairly regular schedule of trips is adhered to in order to keep the work going in a regular manner.

J. A. Shaw, foreman at Flowing Springs

J. A. Shaw is foreman in charge of operations at the quarry.

The company has its own shop for repairing cars and locomotives and quite a settlement has grown up at the lower end of the track. The nearest post office is named Ganister. The offices of the J. L. Hartman Co. are in Hollidaysburg, Penn. J. D. Hartman is the son of J. L. Hartman, who was the pioneer producer of ganister rock in the United States.

National Safety Conference

MEN who are directing accident prevention work in this industry will attend the Fourteenth Annual Safety Congress which will be held at Cleveland, Ohio, from September 28 to October 2 when there will be special sessions devoted to discussions of problems of particular interest to each group. Co-operating with the National Safety Council in staging this convention are the National Civilian Rehabilitation Conference and the National Organization for Public Health Nursing. Addresses will be delivered by more than 200 speakers and several thousand men and women are expected to attend. The delegates will include industrial captains, plant superintendents, factory foremen, police chiefs, municipal officials, educators, health heads and others interested in the numerous activities within the scope of the congress. The features will include general gatherings, sectional sessions, exhibits, contests, moving pictures, dinners, dances and other forms of entertainment.

Rear-Admiral William S. Sims, who is president of the Newport, R. I., Safety Council, will address the congress on "Safety in the Nation," and Howard Coonley, president of the Walworth Manufacturing Co., who is also president of the Massachusetts Safety Council, will speak on "The Relationship of Safety to Operations in Modern Industry" on Monday morning, September 28, and in the afternoon there will be a meeting for industrial executives. A general public safety and health session will be held on Tuesday, September 29. A round table discussion, in which more than twenty men will be called on to deliver short talks, will be held on Wednesday, September 30.

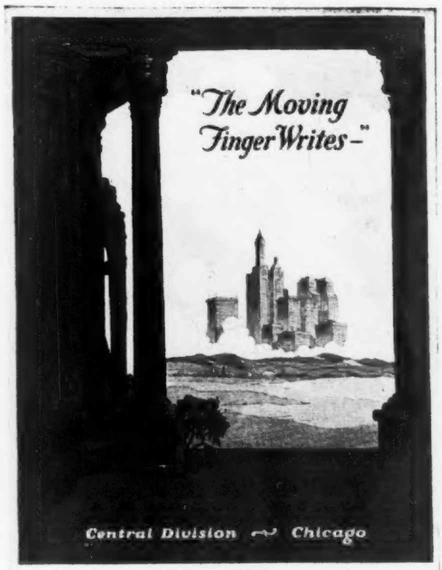
Tidewater Cement Receivership

THE following committee has been formed to protect the interests of the holders of Tidewater Portland Cement Co. first mortgage 6% gold bonds: Wilson A. Campbell, Sewickley, Penn.; Malcolm McGiffin, Fidelity Bldg., Pittsburgh, Penn.; Thomas T. Tongue, 10 Guilford Ave., Baltimore, Md.; Edward H. Letchworth, Marine Trust Bldg., Buffalo, N. Y.; W. C. Fownes, 313 Sixth Ave., Pittsburgh, Penn.; Fidelity Title & Trust Co., depositary, 341 Fourth Ave., Pittsburgh, Penn., and Fidelity Trust Co., sub-depositary, Baltimore, Md.

"The Moving Finger Writes—"

THE National Lime Association, Central Division, Chicago, has recently prepared a very beautiful booklet, its theme is expressed by the verse from Omar Khayyam's "Rubaiyat"—

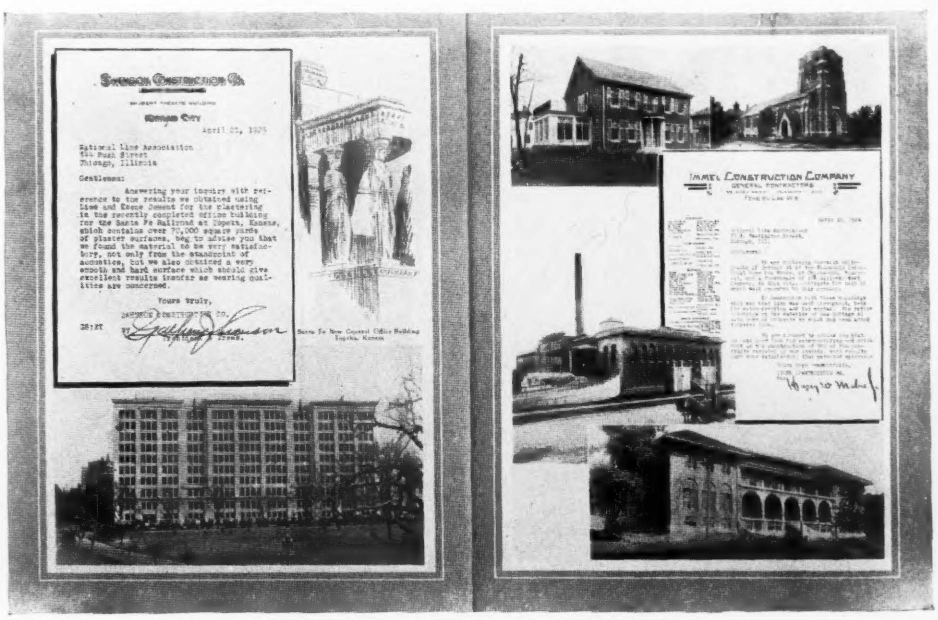
"The moving finger writes—and having writ,
Moves on; nor all your piety and wit
Shall lure it back to cancel half a line;
Nor all your tears wash out a word of it."



Cover of booklet

The booklet consists of a series of letters of testimony from the construction field from architects, engineers and contractors concerning a wide range of construction work and giving their opinions of the value of hydrated lime in plaster, mortar, stucco and concrete work.

These letters, as shown in a reproduction herewith, are each accompanied by photographic illustrations of the work referred to in the letter.



Reproductions of pages from lime booklet

Modern Methods of Mining and Refining Gypsum and Gypsum Products*

Part VII. Treatment of Gypsite—Continued

By Alva Warren Tyler

IN this issue the discussion of the treatment of gypsite is continued, beginning with the subject of storage.

Due to the fact that a gypsite plant, like the rock plaster plant, is usually operated 24 hours per day, while the beds are operated single shift, it is important that proper storage capacity is provided for. Obviously the relation in capacity between mine and mill equipment must be correspondingly provided for. However, storage capacity must not only be provided to take care of these differences but it must also have sufficient capacity to supply the mill during any rainy period that may occur throughout the year. At least a month's supply should be provided for; still more would be desirable.

The necessity for this storage is not only due to the difficulty in operating the beds during wet weather but also to the importance of having comparatively dry material for supplying the mill. The sticky nature of gypsite when damp has already been mentioned, and it is due to this sticky nature that much difficulty is encountered in the mill when excess moisture is present. And even when operating under fairly normal conditions the material will "ball up" and stick most aggravatingly to whatever machinery it comes in contact with; this condition is well illustrated by the fact that wherever carrying chutes are placed before the kettles, they are pitched as steeply as possible to avoid choking. As a matter of fact gypsite in a damp condition will often "hang up" in even an almost vertical spout.

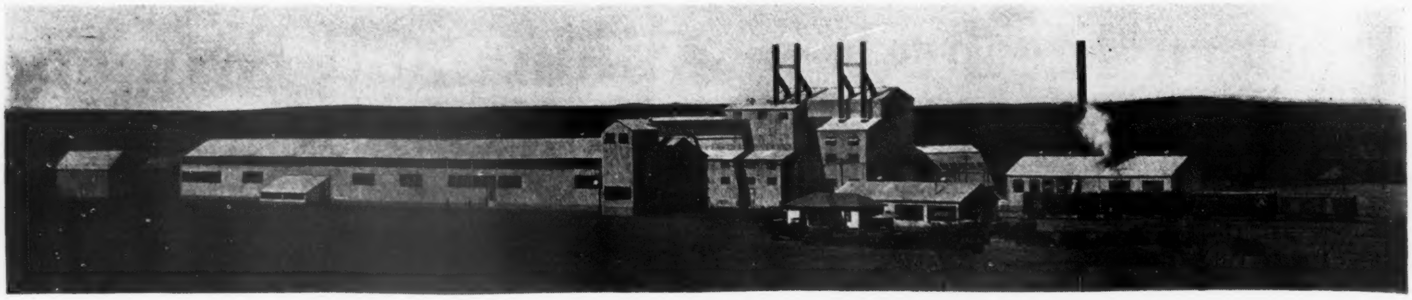
The importance of storing dry gypsite is therefore apparent. In the past the custom has been to store gypsite which had been plowed and exposed to the air during the dry season; however, the success of this method is well illustrated in the installation of the steep spouts referred to above. In other words, with all reasonable precautions in drying in this way and with as systematic mill operation as possible the moisture content of gypsite is nearly always sufficient to cause considerable trouble in handling. And when it is realized that gypsite lying at slight depth below the surface often carries over 10% excess moisture, even in the summer season, the reason for difficulty is explained. However, in spite of the difficulties often encountered due to damp material, through the use of the storage shed the plant may be kept in practically continuous operation, which is sufficient justification for its existence.

Storage at a large Texas plant which treats gypsite

The methods of handling the raw gypsite to and from the storage shed are not at all standardized. In some of the older plants a belt or drag chain is installed in a tunnel below the shed. This drag extends beyond the storage shed proper to a point below a hopper where the cars loaded with the raw material are dumped. The material is then fed by hand to the drag which delivers to an elevator delivering to either the kettles direct or to a belt conveyor which delivers it to the storage bin. When material from the storage is required, gates above this same drag conveyor are opened, allowing the material from the storage to feed into the drag thence to the elevator and to the kettles.

*Copyright, 1925, by Alva Warren Tyler.


A typical southwestern plant in which gypsite is used as the raw material



A Texas plant which makes gypsum products from gypsite

When material is being taken from storage an attendant is always required to keep the material flowing to the drag, since, due to the moisture content already referred to no automatic feeding device has ever proved practical.

This method, while fairly successful, is not yet to be particularly recommended, especially the use of the belt conveyor in the tunnel, for the reason that the tunnel is always damp and therefore undesirable for either men or machinery. In the case of a belt conveyor the rollers are continuously stuck up with the raw gypsite making it practically impossible to keep the belt running smoothly. The dampness rusts the metal parts and makes lubrication difficult. With rollers being continuously stuck up and refusing to operate the belt wears rapidly—altogether making for expensive operation. Belts working under these conditions have given out in less than three months' time.

Where the tunnel method is employed the drag chain is much to be preferred over the belt conveyor, since there is very little machinery to cause trouble and little to wear except the chain. This, of course, will wear much longer than the belt and cost less.

Other methods of handling raw gypsite are the drag scraper using a small hoist, and the overhead traveling crane. The latter method has been employed in a recent installation, and while probably running comparatively high in first cost should prove very economical in operation. There is little to cause trouble and the whole equipment is up where it is easily cared for.

The drag scraper should prove very satisfactory also for this purpose—besides having the advantage of being low in first cost. It will probably not have quite the flexibility or convenience in handling as has the traveling crane, however, and will undoubtedly prove slightly more expensive to operate. Using either of these methods the raw stock is taken from the point where it is dumped by the transfer cars and delivered either to the storage shed or to the elevator delivering to the kettles—or in case material is required from storage it is handled by the same equipment to the same elevator.

It will be noticed that whatever method is employed for handling the raw material either the dump cars or from the storage shed, they all deliver to an elevator which in turn delivers "direct to the kettles." In other words no raw supply bin for feeding the kettles, such as is invariably used in rock gypsum plants, is used. This, again, is due to the excess moisture in the raw material which makes it practically impossible to feed from a bin, either automatically or otherwise.

Calcination

No mention has been made, in the discussion of gypsite, of any calcining equipment other than "kettles." And as a matter of fact no other class of equipment has so far been employed for this purpose. Due to the fineness of this material the rotary calciner, of course, could not be successfully used, and therefore up to the present time the kettle process has enjoyed recognition as the only successful process of calcination in this field.

However, while the same methods are employed in calcining gypsite, as are employed in calcining ground rock gypsum, the two materials handle quite differently. As handled today at least, gypsite is much harder and more expensive to calcine than rock gypsum; much more power is required, which also means larger shafting, gears, motors, etc., for operation; maintenance of furnaces is greater; more expensive kettle-bottoms are required and they burn out more rapidly, due to the greater heat required—and in addition to all this it takes from three to four times as long to calcine the same quantity of material, although the calcining temperature is no greater. The cause of these abnormal conditions is that which has attended and made difficult the handling of this material right from the beds—excess moisture.

It is evident that all excess moisture must be driven off before the process of calcination begins, and when, as is often the case, there is nearly as much moisture on the external surface of the material as is contained in the water-of-crystallization content to be driven off, the reason for these conditions is plain. The fundamental principle on which kettle calcination has been made a success is that during the process of filling the kettle the mass *must be kept in a boiling condition*. When in this condition it is loose and free, easily agitated or stirred and rapidly absorbs the heat from the kettle bottom; consequently there is no heavy pulling to be done and the bottom is kept safely cool.

Vibrating screens working on gypsite

However, as noted in the previous article on "Calcination," should the kettle be filled *too fast* the mass "settles" down on account of the cessation of "boiling," and the power required to pull the agitator increases very rapidly, quite often to the extent that the kettle is "stuck" and will have to be cleaned out before operation can again be resumed. Besides this the bottom is quite likely to

suffer from overheating unless the fire is immediately withdrawn.

In filling a gypsite kettle conditions very similar to "filling too fast" are quite regularly experienced. The temperature required to drive off external, or as expressed above, "excess" moisture is 212 deg. F. while the temperature required for calcination is 250 deg. F., therefore when a quantity of raw material (whether gypsite or rock gypsum) containing a considerable amount of excess moisture is fed into a boiling kettle the temperature of the mass immediately drops to 212 deg. and *remains* at that temperature until all the excess moisture has been liberated; and in the meantime the kettle ceases to boil, the pull on the agitators becomes excessive, and overheating of the bottom results. This condition is particularly imminent during the initial stages of filling, when the quantity of boiling material is small and consequently does not carry sufficient reserve heat to immediately convert the excess moisture into steam.

While in actual practice the conditions, as described above, are avoided as much as possible, their existence may quite easily be established by use of a recording thermometer placed in the kettle and a recording ammeter in the motor circuit. In most cases they may be "pulled through" but many times a "stuck" kettle results.

It is the duty of the calciner, of course, to at all times so regulate the filling of the kettle that it will never cease to boil, and while this is particularly difficult in the case of gypsite, on account of the moisture present, the success in its accomplishment is sufficiently great as to make it a practical operation—in other words the conditions described are only "approached," the non-boiling area being kept localized by slow filling, and by keeping the furnace temperatures at a comparatively high value.

Screening

Gypsite is usually screened after calcination in order to remove any lumps, stones, etc., that may have gotten into the raw material. The screen used should be double-deck, a coarse screen on the upper deck removing the lumps and foreign matter and an intermediate size screen (about 30-mesh) on the lower deck to separate out the small lumps of gypsite that may not have broken down during calcination. The screen is placed in the discharge of the hot-pit elevator, the coarse foreign material going to waste, the coarse gypsite going to a millstone for regrinding, thence to the hot-pit elevator again, and the fines to conveying and elevating machinery delivering to the warehouse.

While not identical, it is seen that the processes for handling gypsite from the kettle to the warehouse are very similar, to those used for handling rock gypsum—however, from that point on they are the same.

Drying Gypsite

To the readers who are not familiar with gypsite and who have followed and noted the many difficulties encountered in its progress from the beds to and through the calcining department, due to excess moisture present, have undoubtedly already formed the question as to why methods have not been employed for drying, since the process could be so greatly simplified by so doing. And the question becomes particularly pertinent when in reviewing the processes used in the refining rock gypsum we find standardized methods of drying which are used where the moisture content is far less than ordinarily found in gypsite.

As a matter of fact rock gypsum with its usual content of excess moisture could be more readily handled without drying than the usual run of gypsite. In fact many of the earlier rock gypsum plants were operated without dryers—their later adoption being due not so much to the difficulty in handling the product, but to the much greater efficiency realized by their use. This increase in efficiency is cumulative, being derived from several different sources, as follows: The material handles freely and easily in both bins and automatic feeders when dry, requiring little attention; the driving mechanism for the kettle sweeps or agitators can be made much lighter and is consequently less expensive; less power is required for driving the kettles; the high furnace temperatures required when calcining damp material is not necessary when the material is dry; therefore being much easier on both the furnace and kettle bottoms; the total fuel requirement is less; and probably the most important item of all is that the process of calcination is completed in from one-half to one-third the time, when calcining dry material. There seems to be, then, more than ample justification for drying before calcination—and if this is true of rock gypsum it should apply in a still greater sense to gypsite.

The answer to the question as to why methods have not been employed for drying gypsite is not one of oversight. The problem has been often considered, but up to the present time at least, no satisfactory method seems to have been developed. The cause of this lack of development is found to be chiefly in the element which it is sought to eliminate—moisture—together with with fine material. In other words moisture, which gives gypsite its sticky nature, is the main obstacle in the solution of the problem of drying. It is evident a rotary dryer such as is used in drying gypsum rock would be a failure on gypsite, since the damp material would stick and cake to the shell, while the fine material succeeding in getting dry would be largely lost in the draft. A dust collector could hardly be employed due to its condensation of the steam and thus returning a large part of the moisture to the dust again.

There are many other types of dryers highly successful for in their particular application, which would likewise prove impractical on gypsite.

However, the solution of the problem is by no means impossible, and as a matter of fact patent applications are in for a dryer especially designed for the purpose of drying gypsite. The machine will soon be placed on the market.

Assuming a successful dryer between the storage shed and the calcining department, the dryer being followed by a small hammer mill to break up any lumps that may have worked their way through, then delivering over a screen to a kettle bin (which will work very successfully on dry material) and we have quite an ideal layout for a smoothly and efficiently operating gypsite plant.

(The next article will deal with the manufacture of Retarder.)

The Value of Steel Reinforcement in Concrete Roads

AN excellent progress report of the special investigation on "The Economic Value of Steel Reinforcement in Concrete Roads" was presented by C. A. Hogentogler chairman of that investigation, at a recent meeting of the executive committee of the Highway Research Board of the National Research Council.

The report showed that inspections have been completed on 375 miles of plain and reinforced concrete roads, varying in age from one to 10 years, and containing approximately 300 comparisons of slabs with and without steel which were subjected to the same influencing conditions. These roads are located in Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, Georgia and Ohio. Roads in other states are still listed for inspection.

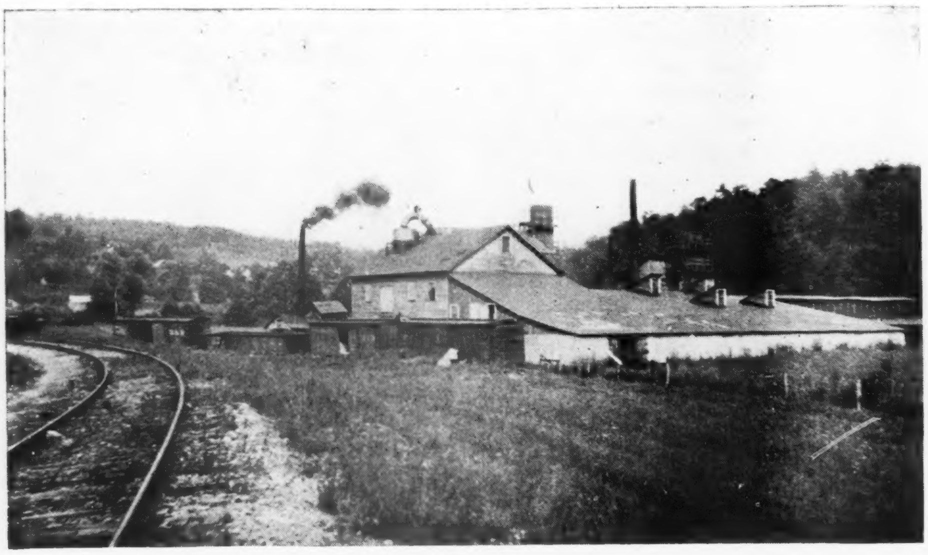
It is thus assured that a sufficient number of direct comparisons will be made to warrant drawing definite conclusions regarding the effect of steel as influenced by age, design, traffic, climate and subgrade, as well as by the type, weight and placement of the reinforcement itself. Detailed sketches, designs and tables are being prepared which will give basic comparisons and a summary of results. Maintenance costs of both plain and reinforced concrete roads have also been secured on a large mileage. These costs are in such detail as to show how the maintenance is influenced by any variable.

The final report on this investigation will be one of the most complete studies on concrete roads ever undertaken. It will be presented at the fifth annual meeting of the Highway Research Board to be held in Washington D. C., on December 3 and 4, 1925. It is planned to devote one of the sessions of the annual meeting to the discussion of this report.

Talc and Pigment Quarrying in Virginia

Plant of the Blue Ridge Talc Company at Henry, Va. Which Produces Ground Talc and Paint and Mortar Colors

THE Blue Ridge Talc Co. of Henry, Franklin county, Virginia, is one of the comparatively few large producers of talc and soapstone in the United States. The company also quarries and prepares mineral pigments for use in mortars, paints, etc.



View of plant from the south showing storage

One of the plant pictures shows the storage erected last winter. A similar storage building is now being erected on the side of the plant at which the track from the quarry enters. This building will give about 4000 ft additional warehouse capacity for mortar colors and talc.

Another picture shows a cut in the quarry in which is exposed a solid formation of talc 14 ft. wide. This is worked in a bench about 26 ft. high, but the full face is 85 ft. high and it extends to unknown depth.

The talc after being broken down is loaded into 2-yd. Easton dump cars and brought in three-quarters of a mile by a Brookville-Ford locomotive. The cars may be dumped into storage, which is on both sides of the track, if it is desired to air dry the crude talc or to hold it as a surplus for bad weather. The storage is always kept filled in the winter.

If the talc is intended for immediate use it is sent to the crusher hopper. The crusher is a No. 3 Sturtevant rotary fine crusher, and its product is taken by a bucket and belt elevator to the service bin over a Fuller-Lehigh indirect heat rotary dryer, which is 3 ft. 6 in. in diameter and 36 ft. long.

The dried material is elevated by a bucket elevator to one or more bins above the Raymond four roller pulverizers and the pulverized material is delivered direct to bagger or barrel packer bins. It is filled into paper bags holding 75 lb. and in 100-lb. jute bags. The better grades of talc are packed in jute bags with paper lining to prevent loss by sifting. Most of the material filled in paper bags is loaded directly into cars for shipping. Jute bags are filled and carried in storage in which there is space for 15 to 18 cars on the talc floor. Some talc for foundry facing is packed in paper-lined wooden barrels. Recently, however, not much talc has gone out in barrels, as the trade is better satisfied with jute bags.

The pigment division uses very much the same process as the talc and soapstone end. Suspended Howe scales are used to weigh and blend the different ores used in paint and mortar color production. From the hopper into which the ores are loaded the material is dumped into a No. 2 Sturtevant rotary fine crusher. The blending hopper is supported on two trolleys which travel on a 6-in. I-beam track from the dry storage sheds where ore is stored. This track passes the suspended scales, a section of the track being suspended at the scales. The crushed ores are then dried by a Fuller-Lehigh rotary dryer. Raymond four roller mills are used in pulverizing, with air separation of the ground product, the same as in the talc end.

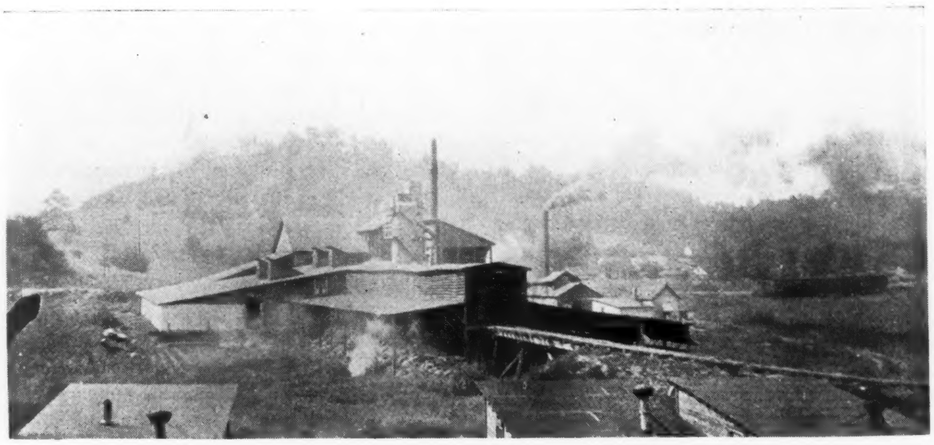
All the machinery in the plant is driven by a steam engine.

Certain of the materials which are used in blending, and added to get uniform shades, are added by a small automatic feeder attached to the Raymond mill feeder. All blending is done before the pulverizing is done, as a much more intimate mix of the different ores and pigments is secured in that way.

Pigments produced by air separation are much finer than those made by screen processes and are always uniform, as there are never any damaged screens to permit coarse material to enter the finished products.

The color and pigment production of the company during the last four years has increased to such an extent that it is now about five times the value of the talc and soapstone.

Pulverized talc is used as a filler in paper, rubber manufacture and in linoleum and also as an inert for insect powders and certain veterinary remedies and for taking up excess oils and forming a parting on back of roll roofing. Because of its heat resisting properties it is largely used in foundries for



View of plant on the quarry side showing sheds for air drying the crude talc

facing molds. Certain classes of castings are made by using talc alone for facing.

The company ships not only to points in the Eastern states but by rail as far West as Kansas City and Northwest to St. Paul

A solid formation of talc 14 ft. wide and 85 ft. high

and Minneapolis; by rail and water to the Pacific coast and Honolulu, into Canada and to Cuba. The company reports that Cuban business this year is 700% above last year with three and one-half months still to hear from. Sales for the first eight months this year are 11 times those for the same period in 1921.

British Rapid-Hardening Portland Cement

IN ROCK PRODUCTS for February 7 a paragraph on the editorial page noted a new quick-hardening portland cement which had the same strength in two days that standard portland cement has in 28 days. Evidently the paragraph aroused some interest in the readers of this paper, as a number of them have written to the editors for further information. In answer to these the following account of tests made on the new cement is published, taken from the January issue of the British journal *Concrete.*

The new cement (which is being used on important engineering structures in England including the new Albert bridge in London) was tested by being made into reinforced concrete beams which were broken in the testing laboratory. The concrete was made according to the following formula printed here as given in the article referred to:

Ham River ballast, 8 cu. ft. passing ½-in. retained on 3/16-in. screen.

Ham River sand, 4 cu. ft.

Cement, one bag of 204 lb.

Water, 10 gal.

"Ballast" of course is "gravel" in America and it is to be noted that the British gallons contain 10 lb. of water, so that using American standards the water figures about 5.8 gal. per sack of cement weighing 90 lb. The mix figures (by weight) about 1-2-4, on a dry basis, assuming ordinary weights for gravel and sand. The reinforcing was of ⅜-in. steel bars.

The beams were supported on exact 15-ft. centers and the load applied on two oak pads 6 in. square, surmounted by steel plates and placed 5 ft. from each end bearing.

No hint is given of the method of manufacture of the new cement but the screen test below shows it to be finely ground. The name might indicate that it contains iron in some form.

TABLE I. LABORATORY TESTS

	Fineness Residue on sieve of 324000 meshes per sq. in	Setting Time — Initial — hr.	Setting Time — Initial — min.	Setting Time — Final — hr.	Setting Time — Final — min.	Soundness Le Chatelier Test 24 hr.	Tensile Tests in lb. per sq. in. 3 parts sand, 1 part cement 1 day	2 days	3 days	5 days	7 days
"Ferrocrete" (Rapid-Hardening) Portland Cement	0.3 %	1	10	2	20	1 mm.	312	516	583	611	688
Ordinary Cement	6.05%	1	50	3	30	1 mm.	117	218	354	405	432

Compression Tests in Pounds Per Square Inch—6-Inch Cubes
4 Parts Ham River Ballast, 2 Parts Ham River Sand, 1 Part Cement

	1 day	2 days	3 days	5 days	7 days	28 days
"Ferrocrete" (Rapid Hardening) Portland Cement	1,750	2,910	3,853	4,840	5,360	6,810
Ordinary Cement	....	....	....	....	2,860	4,440

TABLE II. TESTS OF REINFORCED CONCRETE BEAMS

Cement	Age of Beam		Dimensions Width in.	Dimensions Depth in.	Weight in lb.	First Compression Crack, lb.	Maximum Load in lb.
	hr.	min.					
"Ferrocrete" (Rapid-Hardening) Portland	52	15	6.05	10.5	1,283	13,970	13,970
Ditto	53	17	6.2	10.51	1,291	14,380	14,990
Ordinary	53	50	6.19	10.58	1,292	3,700	3,700
Ditto	54	....	6.26	10.50	1,281	4,130	4,130
	days	hours					
"Ferrocrete" (Rapid-Hardening) Portland	4	3.3	6.19	10.58	1,291	15,580	19,680
Ditto	4	4.15	6.11	10.55	1,270	18,550	18,600
Ordinary	4	4	6.12	10.50	1,269	6,250	6,350
Ditto	4	4.25	6.23	10.55	1,281	6,730	6,860
"Ferrocrete" (Rapid-Hardening) Portland	7	3	6.16	10.55	1,285	18,170	20,900
Ditto	7	3.45	6.36	10.64	1,282	22,195	22,545
Ordinary	6	23.25	6.16	10.59	1,270	9,260	9,260
Ditto	7	....	6.24	10.64	1,285	7,415	7,415
"Ferrocrete" (Rapid-Hardening) Portland	14	....	6.10	10.58	1,275	24,350	24,500
Ditto	14	....	6.17	10.67	1,281	23,990	24,240
Ordinary	14	....	6.27	10.70	1,283	12,140	12,140
Ditto	14	....	6.18	10.57	1,275	12,680	12,710

Philippines Increase Import Duty on Lime and Cement

AN act which became effective on January 15, 1925, in the Philippine Islands increases the import duty on fire clay, lime and roman, portland and other hydraulic cement, from $0.16 per 100 kilograms, gross weight to $0.32 per 100 kilograms, gross weight. Provision is made, however, that upon the recommendation of the minister of finance, the governor-general may reduce the duty on such products to not less than $0.16 per 100 kilograms gross weight, whenever conditions in the Philippine Islands warrant such reduction.

The provisions of this act do not affect the free admission of products of the United States into the Philippine Islands.—*Seattle (Wash.) Journal of Commerce.*

Northern Wyoming Limestone and Gypsum Deposit May Prove Valuable

BUILDING of the highway through Wind River canyon, which was completed July, 1924, unearthed limestone deposits near Theromopolis, Wyo.

There is an exposure of from 8000 to 10,000 ft., the expanse lying between the Embar sand and the granite and it is easily accessible. The manufacture of lime would be practical, according to the *Billings (Mont.) Gazette,* for the reason that the Boysen power dam is at the site of the deposit. Besides, there are the Gebo and Crosby coal mines, or natural gas could be piped from Thermopolis, giving any concern that might operate the choice of three kinds of power.

Within a mile of Thermopolis, both east and west, and only that distance from the Billings-Denver line of the Burlington railroad, is a 100-ft. strata deposit of gypsum, a valuable building material.

The gypsum lies in an anticline and carries no overburden. Adjoining there is plenty of bentonite used in the manufacture of gypsum into building material.

The discovery of the limestone was the result of investigations made by Thermopolis chamber of commerce.

Safety Campaign of Marquette Cement Company Effective

FOLLOWING the inauguration of a "no-accident campaign" for the month of February, the Marquette Cement Manufacturing Co., Cape Girardeau, Mo., reported that but one minor accident had occurred during the month. During the month of February, 1924, there were eight accidents with a total of 145 days time lost to the company.

In January of this year, without the "no-accident campaign" but with the Safety committee of the company at work, but two accidents occurred. The plant employs about 350 men and Manning Greer is in charge of their safety.

Gravel Producers Meet at Cedar Point Ohio, to Further Cause

Progress on Railway Ballast Specifications Reported at Joint Meeting of National Executive Committee and Ohio and Michigan Producers

AN enthusiastic meeting of the Ohio Sand and Gravel Producers' Association, with the executive committee of the National Sand and Gravel Association was held at Cedar Point, Ohio, on August 4. Producers were present from all points in Ohio and some from Michigan. The work of the ballast committee of the National Association was reviewed by Earl Zimmerman of the Ohio Gravel Ballast Co., Cincinnati, and the newly organized engineering bureau of the National Association was explained by John Prince, president of the association.

Both reports were enthusiastically received and the progress of the National Association was fully appreciated and commended. Several new members joined the National Association.

The convention began on August 3 with a meeting of the Ohio producers where freight rates and other local problems were ably presented by Guy C. Baker, secretary of the Ohio Association and vice-president of the Greenville Gravel Co., Greenville, Ohio.

At an open meeting of the executive committee of the National Association on the following day, John Prince, president, explained in some detail what has been accomplished recently by the association, particularly the assistance it has given in ironing out local problems and in organizing producers in several localities.

Washed Gravel Railway Ballast

Earl Zimmerman, general manager of the Ohio Gravel Ballast Co., Cincinnati, Ohio, presented the following report of progress in the work of the ballast committee, of which Fred D. Coppock, president of the Greenville Gravel Co., Greenville, Ohio, is chairman:

"Promoting the wider use of washed gravel ballast is a big job when you consider that its promotion requires that it be done in such a manner as to insure all regular sand and gravel producers an even chance to manufacture and market a ballast product. Your Ballast Committee appointed for this purpose was named in March, 1924, following a discussion of the subject at our St. Louis meeting. After its appointment we held a number of meetings and organized what we called a 'Program of Progress.' This program, while requiring too much time to give in detail, had, I might say, just three things we most desired to accomplish:

"First: To learn as much as we could about the natural deposits of all producers so that any ballast specification which your committee would recommend, or urge for adoption by the railway companies, would best fit the conditions as they exist throughout the United States and Canada.

"Second: To study the railway companies' requirements for a satisfactory gravel ballast, to widen the acquaintance of our Association with railway officers, to prove to them the sincere aim of our producers to make railway ballast as satisfactory as our commercial materials for any construction work; that is, clean, well graded, properly sized and so forth; so that fuller co-operation might and could be obtained.

Guy C. Baker

"Third: We hoped to gain such recognition from the railway companies that would insure an invitation to meet with their General and Sub-Committees on Gravel Ballast with a view to assisting them as well as ourselves to work out a specification and classes of ballast that would give the railway the highest type of gravel ballast, and insure all producers an even chance to produce the material.

"While two years have almost passed since the organization of our Ballast Committee work, it may seem to some of us that our progress has been slow, but please bear in mind that the railway companies, through their American Railway Engineering Association's General and Sub-Committees on Gravel Ballast have spent a longer period of time making a thorough study of this subject and trying to determine what a proper specification should be. Then I think we can decide that we have accomplished, right on time, the three things our Committee set out to do. We are today meeting regularly, I should say, with the railway companies' committees; and you should, by the end of this year, see the adoption by them of specifications satisfactory to all our producers, if I know the least about gravel ballast.

"Our first meeting with the A. R. E. A. Committees was in Pittsburgh, May 28 this year. F. D. Coppock, a distinguished member of our Association, represented our Committee at this meeting and earlier made a very complete report of this meeting, which was widely distributed and with which I know all of you are entirely familiar. I might say, however, that at this meeting the railway companies' Committee discussed in much detail gravel deposits, plant operations and gave much time to the combined general conditions in our industry. There was also, much discussion as to specifications, particularly top and bottom sizes, gradings, and so forth.

"Our next meeting with the railway Committee was in Chicago, June 10. This meeting was called by the A. R. E. A. Ballast Committee for the express purpose of drafting, so far as possible in one day's time, a specification, or classes of specifications for gravel ballast. The railway committee went in session with full attendance, F. J. Stimson, chief engineer of the Pennsylvania Lines, Chicago, chairman of the General Committee; C. E. Dare, engineer, maintenance-of-way, of the Richmond, Fredericksburg and Potomac Ry., Alexandria, Va., chairman of their Sub-Committee in charge; J. B. Bloom, Chicago, Rock Island and Pacific Ry., Chicago, and G. P. McLaren, Canadian National Rys., Toronto, Ont. Your Committee was represented by F. D. Coppock, president of the Greenville Gravel Co., and myself. We were ably assisted by President Prince, Secretary Barrows and A. W. Dann, our ex-president from Pittsburgh, who joined your Committee in this meeting. At this point I desire to state that the interest shown by these Association men and their presence

at our meeting was invaluable; their presence adding to the interest of the meeting and their arguments were effective, favoring wider use of washed gravel ballast.

"The railway companies' engineers discussed at some length and explained very fully indeed, what they would consider as safe and standard requirements of a proper washed gravel ballast—a ballast that: (a) provides good initial drainage; (b) supports the track structure; (c) provides against upheaval by frost; (d) serves as a cushion for the track; (e) eliminates fine sand, dust, dirt or loam to guarantee a dustless road bed or track; (f) permits bringing track to good line and surface with a reasonable expenditure of effort and at minimum expense.

"Following this was a thorough discussion by both railway members and ourselves, as to the varying deposits, operating advantages or difficulties if you please, much in relation to the discussions reported for the Pittsburgh meeting. The Railway Committee, of course, hopes to adopt a specification satisfactory in every respect to the railways and at the same time further the use of gravel without material additional cost to them, if any. This feature was disposed of with the suggestion that increased tonnage for the producers would indeed tend to hold down the price and wider use of washed gravel for ballast could reach such proportion as to no doubt guarantee reduction in prices from certain operations.

"After further discussion it was agreed that on account of the great variance in gravel deposits (no two alike) one specification was not practical except to govern general conditions, cleanliness, foreign matter, top and bottom sizes, range of intermediate sizes and so forth. It was, however, considered practicable to fix some standard or ideal specification to guide the operator and the railway engineer. If any producers could manufacture such an ideal or standard specification ballast, all well and good, for others flexibility would be permitted by adding crushed material sizes, and dismissing at the same time the range of smaller sizes in the straight gravel or ideal specification. Such permission for mixing you can readily see would provide for several classes of ballast equal indeed to the railway companies' safe or standard requirements.

"A tentative specification was worked out, but should not be used or reported today as authentic or as a specification decided upon, since there will be further meetings and the probability of slight changes, and for the further reason that this railway committee is working out washed gravel ballast specifications at this time and will submit them to their convention as a whole, for adoption in Chicago next March. Should the Railway Convention at its annual meeting adopt the finding of the General and Sub-Committee, the adoption would then become the rule. I feel though that whatever this railway committee recommends will be approved, as its personnel are men of wide experience and particularly well educated on gravel ballast requirements and ballast essentials.

"However, it may not be out of place to give the top and bottom sizes suggested in this tentative specification, which may not (and I hope will not) be changed, but accepted by the A. R. E. A. Convention—95% through a 1¾-in. ring and retained on a 1/10-inch mesh with a tolerance of 5% below 1/10-in. mesh. This, please note, gives us a ballast production of 1½-in. down to the 1/10-in. size. It should, of course, be understood that the intermediate sizes must have a relationship to uniformity. This intermediate grading will, no doubt, be specified by reciting the minimum and maximum of different sizes that will be permitted. Different gradings and the mixing of crushed materials would give the producers ample opportunity to furnish a washed gravel ballast in one or more of the several classes referred to previously, and seems to me would put them in the best position I have ever known of to do a ballast business.

Earl Zimmerman

"And now that we are this far along I want to say to our members that your Committee is greatly pleased with the interest you have taken in the matter and with your helpful hints. We will continue our work and when finally a specification is adopted by the railways we trust it will be one satisfactory to all and one that will guarantee to all producers an increased production and an attractive and profitable business. Our membership will then become a Committee of the whole, and it will be up to each individual producer to make or break his own ballast production.

"If our producers will take the same interest in preparing ballast as they do in preparing commercial products they will, no doubt, obtain must larger railway contracts for the material, may be able to lower prices, and then furnish a material equal or exceeding in value other materials used in competition and will no doubt gain merited dominance in the railway ballast field."

R. C. Fletcher, president of the Flint Crushed Gravel Co., Des Moines, Iowa, told of 10 years' experience in furnishing washed gravel ballast to the Chicago Great Western Ry. This railway is thoroughly sold on washed gravel ballast and will have nothing else. Specifications for this material require 25% of sand (less than ¼-in.) although it contains a large percentage of crushed gravel.

As President John Prince pointed out, there are many localities where there is a surplus of gravel over sand and the opening up of the ballast field would have a healthful effect on the commercial business of such operations.

Gravel Versus Crushed Stone in Concrete Roads

Hugh Haddow, vice-president and treasurer, Menantico Sand and Gravel Co., Menantico, N. J., and chairman of the committee appointed by the National Association to deal with the Pennsylvania and New York State highway situation, reported progress. Mr. Haddow thinks it may take a long time to demonstrate that gravel aggregate is the equal of crushed stone in these states where gravel is now excluded from pavement construction on primary roads, but he is sure it will eventually be accomplished.

Mr. Haddow said the way the New Jersey state highway department handled their aggregate problems was enlightening and encouraging. At the start the producers were called into conference with the highway authorities and asked what sizes and kinds of material they could produce to the best advantage on an economical scale. With this information in hand the state highway authorities proceeded to draft specifications to fit the various materials, thus permitting the use of three classes of gravel, containing pebbles of various maximum sizes.

Sand, cement, and water are properly proportioned to the class of gravel used. Contractors are not permitted to use various classes of gravel on the same job, in order to insure uniformity, but the scheme permits the use of some of the smaller sizes of gravel which would have been ruled out under many state highway specifications.

Mr. Haddow said that cleanliness of the material was the all-important factor, and that it was quite possible and probable that there were eastern gravels which are not or could not be properly prepared for highway work.

There was considerable difference of opinion as to whether or not the aggregate situation in these states was a national issue. Mr. Boulay, state highway director of Ohio, thought highway engineers throughout the country as a whole were not particularly swayed by ideas and experience from the East. Col. H. C. Boyden, dean of engineering, Ohio Northern University, and a well-known authority on concrete, differed with this. He thought the matter of cracks in

concrete was something receiving national attention; but, so far as the coarse aggregate used was concerned it probably was a minor factor, the all-important factor being the water-cement ratio.

S. C. Haddon, the new secretary of the Indiana Sand and Gravel Producers' Association, is of the militant type of trade promotion expert, and he did not mince words in dealing with competitive conditions as he found them in Indiana. He is sure the alleged greater cracking of gravel concrete over crushed-stone concrete pavements is "pure bunk."

Pointers on Salesmanship

L. A. Boulay, State Highway Director of Ohio, in an interesting extemporaneous address, gave his hearers some excellent pointers on selling, viewed from the angle of the engineer buyer. He reminded his listeners of something most of us probably overlook; that is, there is almost always a normal tendency to buy. In other words, a natural human weakness is to want to buy whatever is offered. To resist this tendency we have to erect barriers of defense. A winning method of approach is therefore the important part of salesmanship, because the arousing of personal antagonism by untactful methods will destroy the buyer's natural tendency to buy. Untactful methods in selling an engineer in public office are to assume the right to sell because yours happens to be one of many home-state industries and to begin at once to knock your competitor simply because he is your competitor.

Mr. Boulay put quality of product and ability to give service above all other considerations as sales arguments. Proper publicity for various materials as a method of winning confidence in the quality he thought was a very important function of a trade association.

V. "Organization" Johnston

V. O. Johnston, president of the Lincoln Sand and Gravel Co., Lincoln, Ill., and executive secretary of the Los Angeles Sand and Gravel Producers' Association, Los Angeles, Calif., made one of his typical "organization" addresses, which have been rather rare in this part of the country of late. Perhaps no better comment could be made on this than to add that probably all the producers present who were not members of the National Sand and Gravel Association soon afterward signed the roll!

Guy C. Baker wound up the meeting with happily worded compliments for all present, the guests by name and the Ohio producers as a group. The Ohio Association members acted as hosts at a very pleasant dinner party.

Registration at Cedar Point Meeting

Earl Zimmerman and Mrs. Zimmerman, Ohio Gravel Ballast Co., Cincinnati, Ohio.
H. R. Gill and Mrs. Gill, Island Sand and Gravel Co., Columbus, Ohio.
C. E. Glander and Mrs. Glander, Greenville Gravel Co., Greenville, Ohio.
S. Stepanian and Mrs. Stepanian, Arrow Sand and Gravel Co., Columbus, Ohio.
Guy C. Baker and Mrs. Baker, Greenville Gravel Co., Greenville, Ohio.
James N. Dugan and Mrs. Dugan, Dugan Sand Co., Cincinnati, Ohio.
H. C. Fuller, Portsmouth Sand and Gravel Co., Portsmouth, Ohio.
Norman F. Callahan and family, The Callahan Co., Cleveland, Ohio.
E. S. Warner, The Akron Sand and Gravel Co., Akron, Ohio.
W. G. Harris, Rubber City Sand and Gravel Co., Akron, Ohio.
Kenneth K. Kutz, Massillon Washed Gravel Co., Massillon, Ohio.
Mrs. Clarence E. Patty, Greenville, Ohio.
L. E. Williams, United Fuel and Supply Co., Detroit, Mich.
Col. H. C. Boynton, dean of engineering, Ohio Northern University, Ada, Ohio.
L. A. Boulay, director of highways, Columbus, Ohio.
Hal G. Knight, Rubber City Sand and Gravel Co., Akron, Ohio.
L. J. Dyament, Ward Sand and Gravel Co., Oxford, Mich.
Edwin Brooker and Mrs. Brooker, commerce counsel, Washington, D. C.

Alex W. Dann

R. C. Fletcher, Flint Crushed Gravel Co., Des Moines, Iowa.
Frank M. Welch and Mrs. Welch, Greenville Gravel Co., Greenville, Ohio.
M. G. Kerr, Greenville Gravel Co., Greenville, Ohio.
L. K. Warner, The Marion Sand and Gravel Co., Marion, Ohio.
Clifton Hoolihan, The Keystone Gravel Co., Dayton, Ohio.
S. C. Haddon and Mrs. Haddon, secretary, Indiana Sand and Gravel Association, Indianapolis, Ind.
V. O. Johnston, Lincoln Sand and Gravel Co., Lincoln, Ill.
John Prince and Mrs. Prince, president, National Sand and Gravel Association, Kansas City, Mo.
Hugh Haddow, executive committee, National Sand and Gravel Association, Millville, N. Y.
R. C. Fletcher, executive committee, National Sand and Gravel Association, Des Moines, Iowa.
T. R. Barrows, secretary, National Sand and Gravel Association, Washington, D. C.

Ohio Traveling Soil Laboratory

THE New York Central lines will run its traveling soil laboratory through Ohio, the first stop being at Wapakoneta, September 14, and the last at London, October 3. The value of lime and other fertilizers to the local soil will be investigated, three soil chemists being a part of the staff. Two experts on liming will make recommendations as to the best use of liming materials for the various crops. Motion pictures of liming soils and clover growing will be shown. Arrangements have been made and equipment installed to take care of 2500 soil tests during the three weeks' trip.

Alex W. Dann Takes Vacation in Scotland

ALEX W. DANN, vice-president, treasurer, and manager of the Keystone Sand and Supply Co. of Pittsburgh, Penn., sailed on July 30 for Scotland. Mr. Dann embarked at Quebec. He will remain abroad about two months.

Mr. Dann is probably as well known in the sand and gravel industry as any man in the United States. This is due to his long association with the National Sand and Gravel Association, of which he is a former president, as well as to the importance of the company which he manages. In the conventions of the National Association, Mr. Dann has always something of importance to contribute both in a technical way and in the discussions by which the policies of the association are shaped and continued.

We are sure all his friends and admirers in the industry will be glad to know he is taking a well-earned vacation.

Florida Quarry Plant Sold

THE purchase of the Hernando Hard Rock Co., Tampa, Fla., from I. Berner and associates by A. D. Holman, formerly of Hibbin, Minn., and plans for the expenditure of from $200,000 to $250,000 on the enlargement of the plant near Brooksville, Fla., was announced in the *Tampa (Fla.) Daily News* recently.

The plant has been producing about 40 cars of crushed stone monthly. It is expected that this output will be increased greatly under the new management.

Mr. Holman is a mining engineer and was formerly superintendent for A. Guthrie and Co. of St. Paul, Minn.

French Houses of Concrete and Hydraulic Lime

AS a result of the housing crisis, the city of Lyon, France, has taken steps for the construction of a large number of simple dwellings which can be built at low cost, Consul Hugh H. Watson, Lyon, informs the Department of Commerce. Under this plan 192 dwellings were occupied at the end of 1924, 299 will be ready by the end of 1925, and 2341 are to be constructed in an indefinite period of time. Among the dwellings which the city itself constructed a large number are comprised in the scheme known as the Quartier des Etats Unis, situated at Monplaisir-la-Plaine which ultimately will house 12,000 people. In this section dwellings are being constructed of concrete and hydraulic lime up to the first story and thereafter of slag and hydraulic lime. Floors and stair cases are of reinforced cement. A great majority of these houses are of four rooms.

A Notable English Book on Lime and Magnesia

Reviewed by OLIVER BOWLES

LIME AND MAGNESIA, by N. V. S. Knibbs. Published by Ernest Benn, Ltd., No. 8 Bouverie Street, London, E. C. 4. Price 30s.

THIS treatise which first appeared in 1924 covers in one volume the chemistry, manufacture and uses of the oxides, hydroxides and carbonates of calcium and magnesium. Obviously such a broad field cannot be covered completely in a single volume, in view of which the author has stressed those subjects which have not heretofore received adequate treatment, and has treated more briefly the phases of the industries for which it is possible to refer the reader to other texts.

Lime and magnesia are numbered among the oldest known mineral products, and yet published information relating to them is scattered and incomplete. Descriptions of quarries from which the raw materials are obtained and plants for the manufacture of finished products have been widely published during recent years, but other branches, particularly the properties of the materials and the physics and chemistry of the processes involved, have received meager treatment. Therefore a book of over 300 pages dealing chiefly with these latter problems is an important contribution.

The volume is divided into three parts—chemistry, manufacture and uses. Part 1 of 104 pages is the most important, as it covers the much-neglected field of the chemistry and physics of calcination and hydration, as well as the physical and chemical properties of the products thus obtained. The section is composed of nine chapters, beginning with the order and occurrence of the natural calcium and magnesium carbonates, following with the physical and chemical properties of the rocks and their manufactured products and closing with complete methods of analysis and testing of lime and magnesia. Not only is the discussion detailed, but many references are given at the end of each chapter, to direct the reader to the sources of information, and to enable him to make a more exhaustive study of any particular branch of the subject if he so desires. It is both a text book and a reference book.

Through the activities of the National Lime Association in America, and the initiative of the more progressive companies on both sides of the Atlantic, there is a strong movement in the lime industry toward better technical control of the calcination process, the attainment of a higher fuel efficiency and maximum perfection in finished products. This section of the book is of inestimable value in such researches, and on this account the volume should find a place in the laboratory of every technologist in these important fields.

The magnesium carbonate and oxide industries are more recent commercial developments than the lime industry, and their technology is even less fully developed. Therefore the chapter on the general chemistry of magnesium compounds and the data on their properties and preparation are particularly fitting, for a great expansion in these industries has taken place during the past decade. In many places throughout Part 1 emphasis is placed on the great need of wider research, and the establishment of more extended fundamental knowledge. Where published information is scarce and scattered such a book serves a useful purpose in systematizing the known facts and establishing a basis from which further advances may be made.

Part 2, consisting of 87 pages on the quarrying and preparation of raw materials, is brief and incomplete, but this is to be expected in a work which covers chemical technology rather than mining engineering problems. The processes and equipment for calcination and hydration are covered in more detail. Though the book is published in England and applies particularly to British practice, many of the illustrations are of American manufactured equipment, and American methods are adequately covered. Pot and mixed feed kilns are given more attention than their limited employment in America would justify in a purely American text. The chapter on the manufacture of caustic and dead-burned magnesia and dolomite is especially noteworthy.

Part 3, of 67 pages, is devoted to the uses of lime and magnesia, with American statistics according to use. The uses fall into four principal groups—agricultural, building trades, chemical and miscellaneous. The many and varied uses and their industrial importance in every community are covered in detail.

As a whole the work may be regarded as the most useful and valuable compilation that has yet appeared on these subjects, and the author is to be commended for the painstaking toil that such a task involves. If the presentation gives impetus to further research, that in itself will more than justify the labor so advantageously expended in analyzing and classifying our present knowledge on these important topics.

New Report on Limestone

"LIMESTONE RESOURCES OF ILLINOIS," by Frank Krey and J. E. Lamar, Ill. Geol. Surv., Urbana, Bull. 46, 1925.

Reviewed by OLIVER BOWLES

THIS bulletin of 392 pages was prepared in response to an increasing demand for road materials brought about by the ever-expanding movement toward hard roads. As Illinois has no usable deposits of trap or other igneous rocks, the state must rely on limestone and gravel for its road materials. Limestone is produced in large quantities in the state, production in 1923 totaling over 9,000,000 tons exclusive of that used for lime and cement. However, the limestones are not generally distributed, workable deposits occurring in a northern area, and a narrow strip along the western and southern boundaries, leaving about two-thirds of the state practically devoid of workable deposits. This is the first attempt to make a comprehensive state-wide survey of the limestone resources. The descriptions include both active operations and undeveloped exposures easily accessible to railroads. The report deals with distribution, general properties, chemical composition and tests of limestone to determine their suitability for road building.

Following the introduction a chapter is devoted to the origin, distribution and geologic age of the limestones. The methods of sampling and testing are described in some detail. Laboratory tests were quite comprehensive, including weight per cubic foot, absorption, wearing qualities, hardness, toughness and cementing valve. Tables occupying 17 pages give the results of these tests. This is a very valuable addition to our present somewhat limited data on the physical properties of limestones. One chapter is devoted to quarry practice. Markets, transportation lines and competition are discussed in their relation to quarry locations. Quarry methods such as stripping, drilling, blasting, loading, crushing and screening are briefly described. The bulk of the volume, comprising 219 pages, with many maps and illustrations, is devoted to descriptions of quarries or favorable exposures in each of the districts, northern, western and southern. The occurrences are considered by counties in alphabetical order. The 23 pages of chemical analyses constitute another valuable feature of the book. Many new analyses were made in the Illinois state highway testing laboratory, and to these were added other analyses compiled from various publications.

As the uses of limestone are multiplying, and specifications are becoming more rigid, the physical and chemical properties are of increasing significance. Therefore these features are of special interest. As limestones and dolomites are used for many purposes other than for road construction, one chapter is devoted to a discussion of these varied uses, including application in cement and lime manufacture, in agriculture, as concrete aggregate, flux, ballast, building stone, in sugar refining, manufacture of alkalis, paper, refractories, glass, whiting, magnesia and various other commodities. Foot-note references are supplied to guide the reader toward more detailed discussions of these subjects.

The book affords the reader a clear concept of the qualities and distribution of Illinois limestones, but its scope extends beyond any local boundaries, for it supplies sufficient general information and valuable technical data to make it a worthy addition to the bookshelf of any one interested in limestone either scientifically or commercially.

Financial News and Comment

Canada Asbestos Merger Off

WITH regard to the suggested consolidation with other asbestos concerns, the directors of the Asbestos Corporation of Canada, Ltd., have issued a statement as to the reasons for the termination of the same. The letter, signed by President W. G. Ross and Vice-President William McMaster, says:

Proposals were first made by the bankers, Dillon, Read & Co., with a view to consolidating the various companies some time last fall and were continued at intervals up to the termination of negotiations on July 15. During the course of these negotiations and as they progressed, the more difficult the situation became. The first proposals were for simply an exchange of stock for an equal amount of stock in the new company. This was turned down. Later on a new proposition was finally made as regards to the amount of securities to be given the company, with an additional 10 per cent of stock. In endeavoring to come to a definite agreement, however, differences arose.

(1) The directors were assured that the entire undertakings and assets of all companies to the merger would be transferred to the new company; but it was found that with respect to three of the companies a controlling interest only in the securities and creditors' claims was to be acquired at the outset, and there was considerable doubt as to whether these companies could eventually be acquired in their entirety.

(2) The directors considered it necessary that full information be given as to the other companies, and complete disclosure of the terms and conditions of all contracts, undertakings and arrangements should be made prior to the meeting of the Asbestos Corporation shareholders to be called to approve of the merger. This the bankers refused to do.

(3) The directors all along understood and considered it necessary that the proposed issue of bonds were to be underwritten by the bankers. This the bankers declined to obligate themselves to do.

(4) While the proposed agreement provided that the corporation was not obliged to transfer its assets until all the terms and conditions of the option agreement were fulfilled, the bankers, however, explained that the situation was such that they could give no guarantees whatever, and accordingly declined to obligate themselves to create or perform these conditions, or to guarantee the financial structure of the new company, or assume any responsibility in effecting the consolidation.

The directors decided that it was not in the interest of the shareholders to grant the option on the terms as proposed by the bankers, and that, in view of the above principal differences, it was advisable to terminate the negotiations. This conclusion was influenced also by the fact that we believe that the company was the principal one of the proposed group which had a demonstrated earning power.

As regards the company, we are pleased to say that operations continue to show satisfactory increases. The earnings for the six months ended June 30, before deducting government taxes and depreciation, in spite of lower prices, were $286,000, as compared with $216,000 for the same period last year.

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Alpha Portland Cement Co. (common)**	July 31	100	133	136	1½% quar.
Alpha Portland Cement Co. (preferred)**	July 31	100	108	....	1¾% quar.
Arundel Corporation (sand and gravel—new stock)	Aug. 4	No par	35¼	35¼	30c quar. July 1
Atlas Portland Cement Co. (common)**	July 31	No par	52	54	50c quar.
Atlas Portland Cement Co. (preferred)**	July 31	33⅓	43	....	2% quar. July 1
Bessemer Limestone and Cement Co. (common)‡	Aug. 4	....	130	135	1½% quar. July 1
Bessemer Limestone and Cement Co. (preferred)‡	Aug. 4	....	105½	106½	1¾% quar. July 1
Bessemer Limestone and Cement Co. (convertible 8% notes)‡	July 17	....	130	140	8% annual
Boston Sand and Gravel Co. (common)	July 31	100	71	71	2% quar. July 1
Boston Sand and Gravel Co. (preferred)	....	....	....	....	1¾% quar. July 1
Boston Sand and Gravel Co. (1st preferred)	....	....	....	....	2% quar. July 1
Canada Cement Co., Ltd. (common)	Aug. 4	100	105	105½	1½% quar. July 16
Canada Cement Co. Ltd. (preferred)	Aug. 4	100	78	78½	1¾% quar. May 16
Canada Cement Co., Ltd. (serial bonds)	June 30	....	102½	....	3% semi-annual
Charles Warner Co. (lime, crushed stone, sand and gravel)	Aug. 3	No par	22½	24	50c quar. July 10
Charles Warner Co. (preferred)	Aug. 3	100	98	102	1¾% quar. July 23
Giant Portland Cement Co. (common)**	July 31	50	26	29	
Giant Portland Cement Co. (preferred)**	July 31	50	45	50	3½% semi-ann. June 15
Ideal Cement Co. (common)‖	Aug. 3	No par	69	72	$1 quar. June 30
Ideal Cement Co. (preferred)‖	Aug. 3	100	105	110	1¾% quar. June 30
International Cement Corporation (common)	Aug. 4	No par	66½	67	$1 quar. June 30
International Cement Corporation (preferred)**	July 31	100	103½	105	1¾% quar. June 30
International Portland Cement Co., Ltd. (preferred)	Mar. 1	....	30	45	
Kelley Island Lime and Transport Co.	Aug. 4	100	103½	104	2% quar. July 1
Lawrence Portland Cement Co.**	July 31	100	110	120	2% quar.
Lehigh Portland Cement Co.**	July 31	50	69	73	1½% quar. Apr. 1
Michigan Limestone and Chemical Co. (common)‖	Aug. 3	....	23	25	
Michigan Limestone and Chemical Co. (preferred)‖	Aug. 3	....	23	25	1¾% quar. July 15
Missouri Portland Cement Co.	Aug. 4	25	67¾	68	25c quar. Aug. 1; 25c ex. Aug. 1.
Missouri Portland Cement Co. (serial bonds)	May 29	....	104½	104½	3¼% semi-annual
Pacific Portland Cement Co., Consolidated	July 31	....	80½	81	
Pacific Portland Cement Co., Consolidated (secured serial gold notes)§	July 23	....	99½	101	3% semi-annual Oct. 15
Peerless Portland Cement Co.*	Aug. 3	10	8½	9	
Petoskey Portland Cement Co.*	Aug. 3	10	8¾	9½	1½% quar.
Pittsfield Lime and Stone Co. (preferred)	....	100	....	....	2% quar. Apr. 1
Rockland and Rockport Lime Corp. (1st preferred)	Aug. 3	100	98	....	3½% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (2nd preferred)	Aug. 3	100	70	....	3% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (common)	Aug. 3	No par	70	....	1½% quar. Aug. 1
Sandusky Cement Co. (common)*	Aug. 3	100	....	110	2% quar. July 1
Santa Cruz Portland Cement Co. (bonds)	July 18	....	....	....	6% annual
Santa Cruz Portland Cement Co. (common)	July 18	50	....	....	$1 Apr. 1
Superior Portland Cement Co.	Mar. 1	100	....	120	
United States Gypsum Co. (common)	Aug. 4	20	182	183½	2% quar. June 30; $1 ex. June 1
United States Gypsum Co. (preferred)	July 31	100	116	118	1¾% quar. June 30
Universal Gypsum Co. (common)†	Aug. 5	No par	20	23	
Universal Gypsum Co. (preferred)†	Aug. 5	....	76	....	
Universal Gypsum Co. (1st mortgage 7% bonds)†	Aug. 5	....	99	(at 6½%)	
Wabash Portland Cement Co.*	Aug. 3	50	60	100	
Wolverine Portland Cement Co.	Aug. 3	10	10	12	2% quar. Aug. 15

*Quotations by Watling, Lerchen & Co., Detroit, Mich. **Quotations by Bristol & Bauer, New York.
†Quotations by True, Webber & Co., Chicago. ‡Quotations by The Valley Investment Co., Youngstown, Ohio.
§Quotation by Freeman, Smith & Camp Co., San Francisco, Calif. ‖Quotations by Frederic H. Hatch & Co., New York.

Editorial Comment

Our Industries Not Localized

It is a common belief among those not familiar with them that rock products industries are local and must remain so from their very nature. By a local industry is meant one that is confined in its activities to a locality —that is, a town a city, or a county. One would not consider an industry that served an entire state as local, and certainly one that ships its products into several states is not local. There are of course a great many plants in the rock products industries which do what may be called a local business as defined above. This is true of many lines of industry. But there are also concerns in the rock products industries which ship their products to every state in the Union, and others which do some export business, in addition to shipping into a number of states.

If we were to find a purely local business anywhere in the rock products group, we would expect to find it in the making of crushed stone and washed sand and gravel, since the raw materials for these are abundant and widespread and the manufacturing processes are simple. Moreover, the larger part of the cost of such materials "on the job" is that of transporting them **to** the job. Under such conditions we might expect to find industries confined to a single locality, if anywhere, the range of shipments being limited by freight rates.

But such localism is by no means the rule. One could think of enough instances to prove this to fill a page. A sand and gravel plant on Long Island regularly ships a part of its product to Buffalo by way of the barge canal. Shipments are also made for points in Connecticut and there was a proposal to ship to Florida which may have been carried out by this time. At Memphis gravel and crushed stone are brought in from points in Mississippi, Arkansas and Alabama, much of it from a distance of more than 300 miles. At Montgomery, Ala., there are plants that ship gravel over five states. Crushed slag from Birmingham covers an equal area. The plants in the Wabash Valley ship sand and gravel over an area almost as great as the kingd m of Great Britain. Sand is shipped by rail from points near Chicago to Cleveland, and last week at St. Louis the writer learned that one group of quarries regularly ships crushed stone by rail—not by water—as far south as Mississippi, and has made occasional shipments to New Orleans. There is nothing local about such business, nor are the concerns which operate groups of quarries and gravel pits, sometimes in three or four states, at all local in their nature.

Of course nothing said here is intended to depreciate the importance of the local business or the small plant. The business that can find a market for its ouput in a single locality is merely fortunate in not having to make distant shipments. Size has nothing to do with the matter. Some large producers supply a purely local market and some comparatively small producers make shipments to distant points. What is emphasized here is that even those branches of the rock products industries which we would expect to find of a local nature are not necessarily so, and that a goodly proportion of the plants in these branches include not only states but groups of states in their territories.

Pointers on Selling

Addressing a group of sand and gravel producers this week at Cedar Point, Ohio, L. A. Boulay, whose term as State Highway Director of Ohio expires August 11, gave some interesting and intimate experiences on "how it feels to be a highway director." Having sat through the whole session and listened with interest and attention to various recitals of the trials and tribulations of the sand and gravel producers in promoting and selling their wares, he was naturally primed with thoughts, which, being practically through as state highway director, he felt at perfect liberty to express.

He said the great majority of men with something to sell—be it road machinery, cement, asphalt, or gravel—who come to his office rely very largely on their companies being tax payers and public benefactors for their sales arguments. Another stock argument is that the competitive machine or material is N. G.

Mr. Boulay said neither one of these approaches could possibly make much impression on a fair-minded, conscientious public official, nor on an engineer buyer in any capacity. The things he thought that should be stressed were quality and the ability to give service.

The old idea used to be that a *good* salesman could sell anything from fly-paper to steam rollers, and that selling was a peculiar art which required a rare and distinctive type of individual. But in this day that idea is rapidly fading. The salesman, like every other link in the modern industrial chain "must know his stuff."

In selling sand and gravel or stone, or any construction material in large orders (political influence aside), real salesmanship requires an intimate knowledge of your material, its advantages, weaknesses, etc., and an equally intimate knowledge of your competitors' materials, shipping facilities, etc. Such a salesman does *not knock* the other fellows' material, but he is in a position to argue intelligently that *his own* material is the logical and economical one to use and why. He knows enough of the engineers' or architects' language to discuss with them the use to be made of the material and the results to be expected from its use.

Texas Sand and Gravel Company Building Plant on Colorado River

ACCORDING to the *Colorado (Texas) Record,* the Texas Sand and Gravel Co., with principal offices in Waco and plant at Texand, will construct a $40,000 sand and gravel plant on the Colorado river near Colorado, Texas. The railroad spur connecting the plant with the Texas and Pacific R. R. is already under construction.

Sand and gravel will be moved from the river by a dragline operated between 60-ft. towers mounted on railroad trucks on each side of the river. It is expected that production will begin within about two months.

L. D. Eastland is president of the company and T. J. Palm is vice president and general manager.

Tax on Arkansas Sand and Gravel

AN act of the special session of the Arkansas legislature in 1919 exempting from taxation sand and gravel removed from beds of navigable rivers and lakes of Arkansas when it is to be used for road building purposes is unconstitutional and void because it was not within the purview of the governor's call for the special session, Attorney General H. W. Applegate held in an opinion issued recently at the request of W. E. Floyd, commissioner of the Department of Insurance and Revenues, to which the duty of collecting the tax was transferred by the act creating that department.

The original law providing that sand, gravel, oil, coal and other minerals for commercial purposes could be removed from navigable streams and lakes only after a permit had been granted by the attorney general and the applicant had agreed to keep a record of the material removed and pay a tax of two and one-half cents a cu. yd. for sand, five cents a cu. yd. for gravel, one-half cent a gallon for oil and six cents a ton for coal, was passed in 1917.

The special session of 1919 passed a law exempting sand and gravel used for road building purposes, but providing that any firm, corporation or individual removing the material must keep a record of the amount removed and file copies with the attorney general and the county judge in the county from which the material was taken.

The special session of 1919, called by Governor Brough, was to enact laws to decrease the high cost of living, to enable cities and towns to collect additional motor vehicle taxes for street purposes, to establish local road, bridge, drainage, levee and school improvement districts or to cure defects in such existing laws, and to appropriate funds to pay for services rendered during the biennial period ended March 31, 1919.

Attorney General Applegate's opinion says that the sand and gravel exemption law could not have been included under the first, second or fourth clauses of the call for the special session, and cites an opinion of the Arkansas Supreme Court in another case in which it was held that only local legislation could come under the third clause. The sand and gravel law was held by the attorney general to be a general law and therefore not within the scope of the legislative call.—*Little Rock (Ark.) Gazette.*

Building New Molding Sand Plant Near Kerr, Ohio

THE Keener Sand and Clay Co., 514 Hartman building, Columbus, Ohio, is constructing a new sand mill costing approximately $75,000 with equipment. The mill will be used in the production of No. 3 Gallia red molding sand, giving the company a capacity of 600 tons per day. Gallia red sand is produced for medium and heavy gray iron castings. The new plant is located on the Hocking Valley R. R. near Gallipolis, Ohio.

This new construction gives the company double capacity. It has a plant in the same locality producing No. 4, No. 5 and No. 6 Gallia red sand, where the company has operated during the past 20 years. Harry A. Keener is president and general manager.—*The Iron Age.*

Highway Research Board's Annual Meeting To Be Held December 3 and 4

AT a recent meeting of the executive committee of the Highway Research Board of the National Research Council it was decided to hold the fifth annual meeting of the board at Washington, D. C., on December 3 and 4, 1925. Progress reports received from the chairmen of the research committees showed that they are conducting important studies on almost every phase of highway development, including finance, design, construction and maintenance, thus assuring a successful annual meeting. The program for the fifth annual meeting is now being prepared and will soon be announced.

Road Construction in Canada Totals 50,000 Miles

IN 1924 there was expended on the construction of roads in Canada $31,413,-097.49, of which $23,000,000 was for construction, $1,500,000 for reconstruction and about $7,000,000 for maintenance. Reports indicate that a similar amount will be spent this year. There are now 422,942 miles of road open for travel in the Dominion of Canada. Of this, about 50,000 miles are now completed to the standard of gravel, waterbound macadam, bituminous and concrete surfacings.

Standards in the Pump Industry

THE third edition of "Standards of the Hydraulic Society" has just been issued. It contains not only the information embraced in the earlier editions, but also much new and valuable data, such as a standard classification of pumps; standard nomenclature and definitions pertaining to the industry; standard dimensions for cast iron flanges and cast iron flanged reducers for 125-lb and 250-lb steam pressures as adopted by the A. S. M. E.; and a very complete list of chemicals and other special liquids, specifying the materials recommended in the construction of pumps for handling these special liquids.

Copies of the booklet may be obtained from any pump manufacturer who is a member of the Hydraulic Society, or upon application to C. H. Rohrbach, secretary, 90 West street, New York.

What Goes Into a Mile of Concrete Road

THE Portland Cement Association has recently issued some facts regarding the amounts of materials that goes into concrete roads and their cost which will be of interest to the producers of such materials. It says:

"While the cost of concrete roadways varies with the locality and the pavement design, an average of $30,000 a mile is often given for an eighteen foot pavement seven inches thick. Several thousands dollars fluctuation either way in the price would not be unreasonable, depending upon the locality in which paving is done.

"For this sum the community gets nearly 2¼ acres of pavements containing 2000 cu. yd. of mixed concrete. This calls for 3400 bbl. of portland cement or seventeen carloads. It calls also for 1000 cu. yd. of sand, equalling thirty-two carloads. It calls likewise for 1600 cu. yd. of gravel or stone, which is forty-six carloads. Into this mixture will have to be poured 300,000 gallons of water, which is thirty-eight tank carloads. The total weight of this concrete would then approximate 4000 tons.

"Before the cement could be delivered 400 lb. of dynamite would be required to blast the rock which went into it. The fuel necessary to burn the rock would total 340 tons of coal, or its equivalent in oil or gas. While cement requirements are commonly measured by the barrel, it is usually delivered in sacks holding a cubic foot each. And 13,600 such sacks would be required for the cement in the mile of road. Thirteen bales of cotton would be needed for these. Into the cement would go nineteen tons of gypsum, which is necessary to regulate its time of setting.

"Except for the great improvements in methods of building concrete roads developed during the last 15 years, converting this great mass of materials into pavements at the rate needed would be impossible."

New Hydrating Plant of the Whiterock Quarries

THE Whiterock Quarries, Bellefonte, Penn., has installed a new Kritzer hydrating unit at their crushed stone and lime plant at Pleasant Gap, Penn., and it is now in operation.

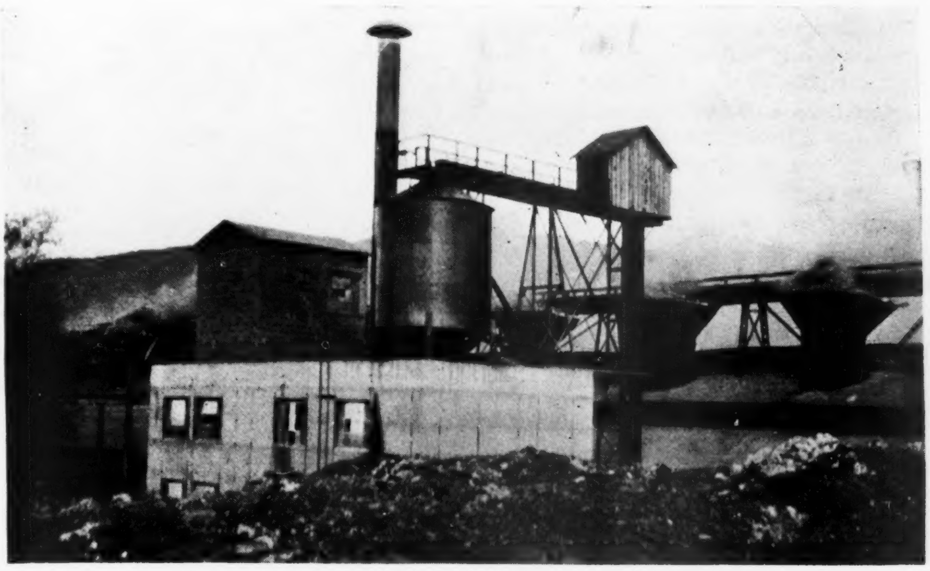
There are 18 5½x30 ft. kilns at the plant producing high calcium lime for chemical, agricultural and construction purposes. About 200,000 tons of furnace flux, ballast and crushed stone are also produced at the plant annually.

W. Fred Reynolds is president of the company, A. Fauble is vice-president, L. A. Schaeffer, secretary, and Ray C. Noll, treasurer and general manager.

Ann Arbor Fellowships in Highway Engineering

THE board of regents of the University of Michigan will award the following fellowships not later than November 1, 1925. Several fellowships will be awarded about September 1 to men who intend to be in residence during the first semester.

Two Detroit Edison Fellowships in Highway Engineering, which are offered to provide for the investigation of approved subjects relative to moderate cost country roads.



Kilns and hydrating plant of the Whiterock Quarries

Connection between kilns and hydrator

The National Slag Association Fellowship in Highway Engineering, which is offered to provide for the investigation of the utilization of blast furnace slag in the construction and maintenance of roads and pavements.

The Reo Motor Car Company Fellowship in Highway Transport, which is offered to provide for the investigation of the economic utilization and operation of motor busses.

The Roy D. Chapin Fellowship in Highway Transport, which is offered to provide for the investigation of an approved subject relative to Highway Transport.

The Roy D. Chapin Fellowship in Highway Engineering, which is offered to provide for the investigation of an approved subject relative to hard surfaced roads and pavements.

The United Fuel and Supply Company Fellowship in Highway Engineering, which is offered to provide for the investigation of efficient methods of sampling gravel.

General conditions: Each fellowship pays the sum of $250 with an allowance of $50 for expenses. Fellows do not have to pay tuition fees, thus increasing the value of a fellowship by not less than $80. A fellow must hold a Bachelor's Degree from a college of recognized standing. He must enroll as a graduate student in highway engineering or highway transport and as a candidate for the degree of master of science, master of science in engineering, or doctor of science. He must be in residence for one of the following periods: First semester (October to February); winter period (December to March); second semester (February to June). An application for a fellowship must include a concise statement of the candidate's educational training and engineering experience, three references, and must be accompanied by a photograph of the applicant. Applications for fellowships and requests for information pertaining to the twenty-seven advanced professional courses in highway engineering and highway transport offered by the graduate school should be sent to Prof. Arthur H. Blanchard, 1026 East Engineering Building, University of Michigan, Ann Arbor, Michigan.

During the months of December, 1925, to March, 1926, inclusive, the University of Michigan will offer twenty-one professional Short Period Courses in Highway Engineering and Highway Transport especially designed for mature men in practice or preparing for positions in the fields of Highway Engineering or Highway Transport or with companies manufacturing machinery or materials used in Highway Engineering, or motor trucks, trailers or motor coaches. Eighteen of these courses are open to any person over twenty-one years of age. Each course will consist of thirty lectures, will be given in a period of two weeks, and will count as two hours credit towards the total of twenty-four hours required for the Master's degree. The fee for each course will be $10.

Rock Dusting Coal Mines

THE following editorial from the *Pittsburg (Penn.) Post* is an evidence of the interest taken by the public in the rock dusting of coal mines:

"Announcement by the American Engineering Standards Committee of the formulation through the co-operative effort of interested groups, of a comprehensive code for rock-dusting coal mines to prevent explosions of coal dust will be particularly gratifying to Pennsylvanians who for years have been taking this precaution and recommending it. Several months ago there was a discussion of the subject in these columns and a number of practical miners and mining engineers wrote approvingly of the rock-dust device. Thus it is cheering to read in this announcement from New York that explosion of coal dust can be prevented 'by the simple expedient of spreading rock dust thickly enough to cause an incipient coal dust explosion to die out rather than to travel through the mine atmosphere.'

"With the efficacy of the precaution as a life saver proved the interests of humanity should be enough to cause application of it wherever needed."

Ohio Hydrate and Supply Company Building New Limestone Products Plant

THE Ohio Hydrate and Supply Co., Woodville, Ohio, are erecting a new plant with a capacity of 5,000 tons per 10-hr. day, to cost approximately $300,000. A 60 by 84 Traylor jaw crusher with feeder is being installed below the quarry level. The stone from the crusher will be conveyed by a bucket type pan conveyor to a sorting screen, making three separations, namely, kiln stone (five to eight inches), blast furnace dolomite (two to five inches) and "fines" (two inches down).

The kiln stone will be moved by industrial cars from the bins in the quarry to the kilns. The blast furnace stone will be hauled by cars over an incline to railroad cars. The "fines" will be conveyed by a 30-in. belt conveyor to a screening plant and classified into ten commercial sizes. The bin capacity of the screening plant is 30 carloads.

A Marion catapillar electric shovel equipped with a 3½-yd. dipper will be used for loading. The quarry cars will have a capacity of eight yards.

Concrete has been poured for the foundations and the buildings are now being erected.

1926 Chemical Equipment Exposition to Be Held in Cleveland

THE Association of Chemical Equipment Manufacturers has announced that its Second Chemical Equipment Exposition will be held in the $6,000,000 public hall in Cleveland, May 10 to 15 inclusive, 1926.

The exposition will follow the general lines of the recent First Chemical Equipment Exposition of the association held in Providence.

G. B. Arthur Appointed Technical Director of National Lime Association

THE board of directors of the National Lime Association at a meeting held in Chicago on July 9, approved the following changes in policy and personnel of the Association:

G. B. Arthur, district manager of the Central Division, Chicago, was appointed assistant to the president, with direct general charge of all scientific, technical, research, field and general publicity work of the Association and its divisions.

The purpose of this move was to relieve Burton A. Ford, secretary and general manager, of certain technical supervision so that he might be able to devote all of his time to the increasing secretarial and business duties of the Association. It also places a man who is a trained engineer in general charge of the technical and field work so as to bring about a direct tying-in and coordination of the research work with the field work. Mr. Arthur is well qualified for the position by virtue of his three years of efficient work as manager of the Central Division. The appointment of a successor to Mr. Arthur as district manager will shortly be made. He will continue in general direction of the district field managers, when selected by the Divisions.

Olympic Cement Earnings

THE net profit of the Olympic Portland Cement Co., Ltd., Seattle, Wash., for the year of 1924 amounted to £67,996 (against £70,237 for 1923) before deducting debenture redemption sinking fund (£6310 against £7293) and depreciation (£9305 against £13,864). The previous year's transfer of £25,000 reserve was repeated and the dividend for the whole year was raised from 12½ to 14%. The "carry forward" was slightly higher, being £20,038 against £19,793 in 1923. Production for the year amounted to 520,314 bbl. compared with 559,922 bbl. in 1923.

The company is owned by English capital and the plant is located at Bellingham, Wash. Thomas Rose, 7 Gracechurch street, London, E. C., is secretary of the company.

Cement Securities Company Complaint Dismissed

THE Federal Trade Commission has dismissed its complaint against the Cement Securities Co., Denver, Colo., a concern engaged in purchasing and selling stocks, bonds and other securities, particularly in connection with corporations manufacturing cement, plaster, lime and like materials. The complaint charged the respondent with combining stock and assets of competing cement companies with an alleged tendency to create a monopoly and lessen competition in the cement industry.

Commissioners Nugent and Thompson dissented and will later file a memorandum of dissent.

New International Cement Common Stock Taken

THE new offering of 100,000 shares of International Cement Corporation common stock at $50 a share has been fully subscribed. This offering was a part of the financing for the acquisition of the Phoenix cement properties in the South and the Indiana Portland Cement Co. properties in Indiana. The entire offering of $6,750,000 in 7% cumulative preferred stock, as noted in the July 11 number of ROCK PRODUCTS, was taken up with a few hours after books were opened.

Portland Cement Prices—First Quarter 1925

THE following table shows the average prices, per barrel, paid January 1, February 1 and March 1, 1925, by contractors for portland cement delivered on the job exclusive of containers. These prices secured through the Bureau of the Census:

	Jan. 1	Feb. 1	Mar. 1
New London	$3.43	$3.43	$3.43
Fall River	2.90	......	2.94
Poughkeepsie	2.70	2.75	2.70
Albany	3.34	3.34	3.34
Schenectady	3.20	......	3.20
Rochester	3.35	3.35	3.35
Buffalo	3.03	3.03	3.03
Scranton	3.00	3.00	3.00
Baltimore	2.70	2.70	2.72
Washington, D. C.	2.60	2.60	2.60
Richmond	3.20	3.35	3.35
Fairmont	2.85	2.85	2.85
Columbia	3.50	3.50	3.50
Savannah	3.25	3.25	3.25
Shreveport	3.40	3.40	2.90
Kansas City	......	......	2.50
Pittsburgh	2.85	2.85	2.85
Erie	3.40	3.40	3.40
Akron	3.20	3.20	2.81
Cleveland	3.08	3.48	3.48
Toledo	3.40	3.40	3.60
Lorain	3.20	3.20	3.20
Columbus	3.00	3.00	3.00
Dayton	3.12	3.12	3.12
Detroit	3.00	3.00	3.00
Saginaw	2.50	2.50	2.75
Bay City	2.42	2.42	2.42
Syracuse	3.30	......	......
Haverhill	3.20	......	......
Fitchburg	2.70	......	......
Milwaukee	2.40	......	......
Madison	2.75	2.75	......
Waterloo	2.70	2.70	2.70
St. Louis	2.70	2.70	2.70
Springfield, Ill.	3.08	3.08	3.24
Rockford	2.80	2.80	2.80
Chicago	2.10	2.15	2.65
Peoria	3.20	3.20	3.20
Terre Haute	2.90	3.00	3.00
Fort Wayne	2.90	2.95	2.70
South Bend	3.10	3.10	3.10
Duluth	2.73	2.73	2.75
St. Paul	2.75	2.75	2.75
Sioux Falls	2.80	2.80	3.20
San Antonio	3.60	3.60	3.60
Tucson	3.90	3.85	3.85
Denver	3.40	3.40	3.40
Los Angeles	2.60	2.60	2.60
Long Beach	2.60	2.60	2.60
San Francisco	2.43	2.83	2.43
Sacramento	3.25	......	3.15
Portland, Ore.	3.00	3.00	3.00
Spokane	3.23	......	......
Seattle	2.75	2.50	2.75

Correction

IN the discussion of the Research Conference of the National Lime Association Convention appearing in the June 13 number of ROCK PRODUCTS the statement was made that no committee was appointed to consider the adoption of a standard for the measurement and statement of kiln operation as suggested by Victor J. Azbe. This statement was in error as such a committee was appointed by President Charles Warner. The personnel of the committee will be announced in the published proceedings of the convention.

San Antonio Cement Awarded Large Contract

CEMENT for the construction of the Olmos, Texas, dam has been awarded to the San Antonio Portland Cement Co., according to the *San Antonio (Texas) News*. The contract calls for approximately 100,000 bbl. at $3.07 including sacks redeemable at 10 cents each.

United States Gypsum Company Improving Plants

IMPORTANT ADDITIONS are being made to two of the United States Gypsum Co.'s plants. At Staten Island, N. Y., an unusual construction is being carried on to provide additional rock-storage capacity, and a new specialty plant is being added to the property at Gypsum, Ohio.

Eight "skyscraper silos" are being erected at the Staten Island factory by the General Contracting Co. of New York. The reinforced concrete tanks have walls 9 in. thick, 56 ft. in diameter and 70 ft. high, exclusive of the steel roofs and galleries that will surmount them.

This plant is the only one in the American gypsum industry for which the raw material is imported rock. Gypsum is brought down from Nova Scotia by a fleet of boats owned and operated by the company. Owing to peculiar conditions in the Bay of Fundy navigation usually is closed four months each year. With the present tendency of the building industry to carry on operations throughout the winter it is necessary to operate the plant at capacity all year. With the increased demand made in those centers, additional rock-storage capacity has become necessary.

Each of the silos will contain 7500 tons, which, with present facilities, will make the total storage capacity at the mill in excess of 100,000 tons. This will provide material for capacity operation throughout the winter.

With this construction, all the rest of the receiving equipment on the property is being revised. Dockage is being repaired, brought out to the bulkhead-line, resurfaced with concrete and extended to a total length of 2000 ft. One Maine Electric traveling Gantry crane with 2½-ton clamshell bucket is being installed now, and another one will be added in the near future. This will make it possible to unload rock from the boats at the rate of 500 tons an hour, which, in turn, permits making more cargo-trips during the shipping season.

Gypsum rock will be lifted from the boats by the gantrys, which will deposit it on a 36-in. belt conveyor running parallel to the silos. After passing over a weightometer it will be elevated to the two receiving silos. From the bottoms of these it will be withdrawn and conveyed mechanically to the crusher building, where it will be reduced in size and then passed over a set of Hummer screens. The fines will be used immediately. The layout is so arranged that the remaining rock may be processed at once or returned to the storage silos or to the old storage bins.

This construction was started May 1. It is scheduled for completion September 1 and two months later the silos are expected to be filled with 60,000 tons of Canadian rock.

The addition to the plant at Gypsum, Ohio, is expected to be in full operation by August 1. It consists of a permanent fireproof building, 36 by 144 ft., its floor and foundation of concrete, its frame of steel, its walls of "Structolite" and its roof of "Sheetrock-Pyrofill" construction.

The best modern industrial practices in lighting, heating and ventilating have been incorporated, and the latest improved crushing, grinding, screening, mixing and packing machinery has been installed. This plant will manufacture four of the company's specialties—patching plaster, Sheetrock Finisher, a colored stucco-finish and a plastic paint for interior decoration which gives both texture and tone.

Previous to this, the stucco has been manufactured only at Staten Island and the paint, at Fort Dodge, Ia. The new plant is necessary to afford more economical distribution to these commodities and to meet the requirements of the fact that the specialties are assuming increased importance in the company's business. At the same time the plant laboratory is being enlarged and its personnel is being increased so as to give scientific control to the manufacture of every ton of the specialties, in which uniform color and quality are essential.

Court Upholds U. S. Gypsum Wallboard Patents

THE United States Gypsum Co., Chicago, won a decision in the U. S. District Court from the Bestwall Manufacturing Co. The decision upholds the opinions of lower courts. It protects United States Gypsum Co.'s patents on the folded edge of "Sheetrock" wallboard and on the wallboard itself.—*New York Wall Street Journal.*

Sources of Limestone, Gypsum and Anhydrite for Coal Mine Dusting

AS a result of numerous investigations on the effectiveness of rock dusting for preventing explosions in coal mines and because of the continually wider adoption of rock-dusting methods, the Department of Interior, Bureau of Mines has issued a bulletin No. 247 by Oliver Bowles, on "Sources of Limestone, Gypsum and Anhydrite for Dusting Coal Mines to Prevent Explosions." In the introduction is given a discussion of the causes, propagation and prevention of coal dust explosions. The amount of dust necessary for effectiveness, the grain size of the dusting particles and the cost of dusting are also considered.

As the general use of limestone and gypsum in dusting depends largely on the cost and the cost in turn depends chiefly on transportation a survey was made on the sources of these materials. Maps are given in the book showing these sources of supply for each of the principal coal-mining States along with descriptive information and lists of producers from whom these materials might be obtained as well as railway connections from quarry to mine.

The subject is treated very thoroughly and comprehensively and should prove a great help toward more complete application of rock-dusting for the elimination of disastrous explosions.

New Company to Develop Oregon Diatomaceous Earth Deposit

FOR the purpose of taking over and developing extensively the deposit of diatomaceous earth near Terrebonne, Ore., the Atomite Corporation has been formed under the laws of Delaware by Eastern financiers with a capitalization of $6,300,000. The corporation plans the immediate construction of kilns and seven miles of railroad, representing an outlay of about $500,000.

Announcement of the deal was made at Portland, Ore., by J. W. Ganong, who is operating the Diatomite Co. The Atomite Corporation took over the property of the Diatomite Co. on August 1.

The output of the Diatomite Co. was a carload of powdered product a day. The new corporation proposes a production of 15,000 tons annually at first, then 30,000 tons, and in a couple of years a 50,000-ton output.

Hartwig N. Baruch is chairman of the board of directors of the Atomite Corporation, Arthur H. Krieger is president, Walter L. Jordan, vice-president, and Phelan Beale, the secretary and treasurer. Mr. Ganong is on the board of directors.

The deposit consists of 800 acres, seven miles west of Terrebonne. The deposit is 30 ft. thick and is covered with 12 ft. of gravel. Of the deposit, 265 acres have been explored. The mining of the Diatomite Co. has resulted in a clean quarry face 800 ft. long.—*Seattle (Wash.) Journal of Commerce.*

Columbia Quarries Has Large Blast

APPROXIMATELY 150,000 tons of rock was shot at the Columbia Quarry Co.'s plant twelve miles south of East St. Louis, Ill., July 29.

Four months' preparation was necessary to make ready for the big blast and sufficient rock was broken to keep the quarry force busy for five or six months. The total cost of the blast, including preparation, was $68,000. The dynamite cost $8,000; about 25 tons being used.—*Chicago Journal of Commerce.*

National Cement Company, Limited, May Double Plant Capacity

MEETING of shareholders of National Cement Co., Ltd., of Canada, was held recently for the purpose of asking ratification of a proposal to increase the authorized preferred stock from $1,500,000 to $3,000,000. It was explained that the company may double the present capacity of 900,000 bbl. a year, as this could be done at an extra expenditure of about $500,000.

It is also desired to have some additional working capital, as it is anticipated that as soon as operations are begun the company may have to face a cut in prices on the part of a competitor. It was reported that the company was only awaiting a delivery of some motors before the mill was started and it was expected would be ready within four or five weeks.

It is probable that the most of the new preferred stock would be offered in the United States. The total issue of $1,500,000 bonds have been disposed of and about $800,000 of the preferred stock.

June "No Accident" Campaign in Cement Industry Reduced Mishaps 66 Per Cent

WHAT is believed to have been the first "no accident" month campaign ever held by an entire industry in the United States has resulted in a reduction of 66% in the mishaps occurring in portland cement plants during June of this year.

Of the 125 plants which took part in this campaign under the direction of the Portland Cement Association, 72 were able to show an absolutely perfect safety score for June. Not a single accident occurred in that time.

In June, 1924, there occurred among the 35,000 workmen employed in American cement plants, 272 time lost accidents. In June, 1925, there occurred in this same group only 92 such accidents, and the reduction in the amount of time wasted by these mishaps was directly proportional to the number of accidents.

In June, 1924, the portland cement industry lost time equal to one man's work for 4,214 working days. In June, 1925, however, the drive for safety reduced this loss to only 1,440 working days. This is a saving of 2,774 working days, or 65% of the previous waste of time.

While the "no accident" month campaign effected a most gratifying saving in time and money for the portland cement industry, it did not necessitate any great expenditure for mechanical safety device. The portland cement industry has spent quite a lot of money in safety equipment, but it has now come to the realization that the best safety device is a careful employee.

The success of the campaign is attributed to the fact that the safety work in the various plants of the industry has been directed from a central bureau of the Portland Cement Association, which has supervised lectures, the distribution of literature, the posting of placards, the giving out of bulletins with mottoes, etc.

This bureau is very quick to seize upon improved safety methods and to pass around information concerning them. Wherever a plant is found whose safety work has needed improvement, the bureau bends all its energy to assist the plant management in bringing their "no accident" methods up to date.

Most of the cement makers have progressed to the point where it is now possible to leave some of the plants to their own direction and concentrate efforts on another portion of the field in which the safety methods have not been so thoroughly adopted. When efforts have been expended here for another year, it is expected that it will be possible to hold a safety campaign which will make a still greater reduction in the number of accidents.

Standard Cement Plant About Completed

WORK is rapidly nearing completion on the new plant of the Standard Portland Cement Co. at Fairport, Ohio, 2½ miles north of Painesville, Ohio. All of the major equipment is installed and has been operated, for the purpose of testing and wearing-in bearings.

The plant has many innovations, one of which, for example, is a three-story packhouse. It was designed by the Fuller-Lehigh Co., Allentown, Pa. Construction is by the Spencer Construction Co., who doubtlessly have broken a time record on cement plant construction, ground having not been broken until Feb. 1, this year. It is expected by Superintendent E. J. Ochs that the plant will be producing finished cement by August 1. A full description will appear in an early issue of ROCK PRODUCTS.

New Building Material from Kisselguhr

ACCORDING to an abstract in *Journal of the American Ceramic Society* of an article in the *Quarry and Surveyors' and Contractors' Journal*, 30, 102 (1925) a new building material is being manufactured in Vienna, Budapest and Prague, made of a mixture of kieselguhr, portland cement and sawdust. This new material is being used rather extensively in Austria and Czechoslovakia. Tests have shown that these diatomite blocks will stand 1100 lb. per sq. in. compression. When tested standing on edge, as in walls, these blocks withstand a load of 550 lb. per sq. in. The material is fireproof, repels vermin and can be used as a lining and ceiling material.

Missouri Portland Cement Co. Adds Two Kilns to St. Louis Plant

THE Missouri Portland Cement Co. is adding two kilns to its St. Louis plant and making other changes and additions to its equipment which will greatly increase its capacity. It is expected that the enlarged plant will be in full production by the first of the year.

This company recently changed its St. Louis plant from the dry process to the wet and finds the change an improvement. C. A. Homer, one of the vice-presidents of the company recently told a ROCK PRODUCTS editor that the change had done all that was hoped for in securing a continuously uniform and high-grade product. The variations in analyses are now to be measured only in fractions of a per cent.

As showing that the public appreciated the uniformity of wet process cement, Mr. Homer spoke of one customer who placed an order for 35,000 bbl. with the stipulation that the cement should be made by the wet process. The customer said that he would be willing to pay a bonus of 10 cents a barrel for wet process cement, his reason being that he would feel more certain of its uniformity in making concrete blocks, the product for which the cement was wanted, and he could use it without going to the expense of testing.

The Commonest Cause of Accidents

"NEGLECT, carelessness, indifference, violation of rules, recklessness, chance taking, overconfidence, curiosity, and hurry may be enumerated as the real causes of about 90 per cent of preventable accidents that are happening every day.

"What we need is an awakening to the fact that the greatest enemy to our safety is ourselves. We are notoriously a nation of chance-takers, careless and thoughtless even when we know quite well that the things we are doing are dangerous. We grow to have contempt for hazards with which we are familiar. When we see a warning sign, or rule, posted, 'Don't do so and so,' we refuse to be don'ted and immediately proceed to do it. Nobody is going to interfere with our liberties; oh, no! We respect the 'stop, look and listen' sign at the railroad crossing by stepping on the gas and trying to beat the train.

"Why do we deliberately do a hazardous thing when we know that others have been injured or killed just because they did that very same thing? Why take these foolish chances? Why so ready to gamble with limb, or eyesight, or life at stake if we lose, and nothing of value to be gained if we win?"—*Alex McDonald in The Anode.*

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

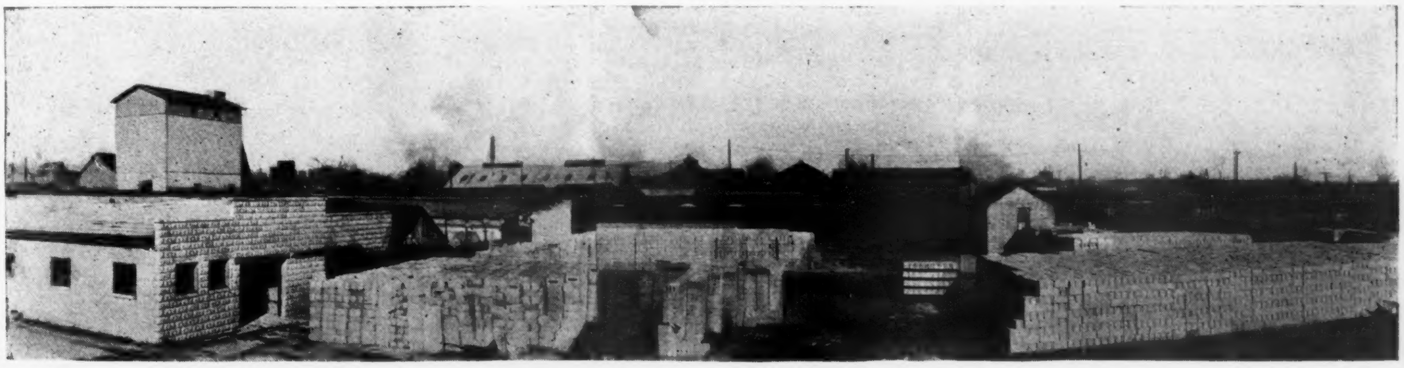
A Plant Which Makes Blocks of Washed Limestone and Sand

Operations of the Cunard-Lang Concrete Block Co., at Columbus, Ohio, Embody the Results of Their Seventeen Years of Experience

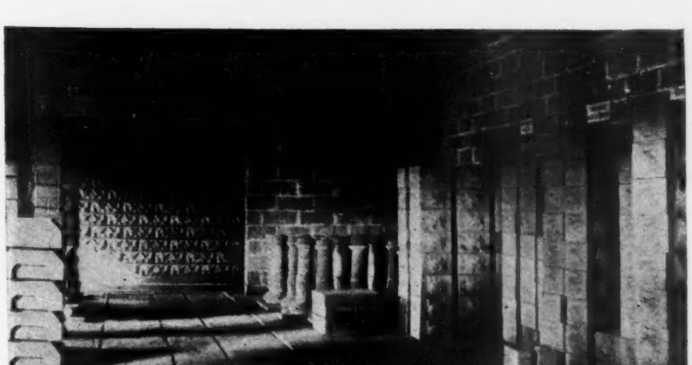
THE Cunard-Lang Concrete Block Co. is about the oldest concern making concrete block in Columbus, Ohio, and one of the oldest in the country, as it has been in the business for 17 years. That is about as long as blocks have been made on any sizable scale in the United States. The plant has developed with the art of making blocks, machinery taking the place of hand work, more efficient machines displacing earlier types and material handling equipment being added to save labor and give increased output.

George Lang, the president and manager of the company, says that the progress of the company has been steady, although the war gave it some lean years as building was so restricted during that period. Naturally a good deal of experimenting had to be done at first but that period has long been passed, and both materials and methods are now thoroughly standardized.

This plant employs a somewhat unusual aggregate, washed limestone furnished by the Marble Cliff Quarries Co. of Columbus, which washes all sizes of limestone below 3 in. This limestone runs from ½ in. to ¼ in. and is the coarse aggregate of the mix. The fine aggregate is washed river sand mainly furnished by the Island Sand and Gravel Co. of Columbus. A small amount of fine sand from the lake shore is used in facing blocks.



Panorama of plant of the Cunard-Lang Concrete Block Co.



Unusually artistic concrete trim and ornamental shapes are made by this company

The mix is by volume, a bucket on a monorail track below the aggregate bins serving as a measure. Water is also added by measure, and cement by the sack.

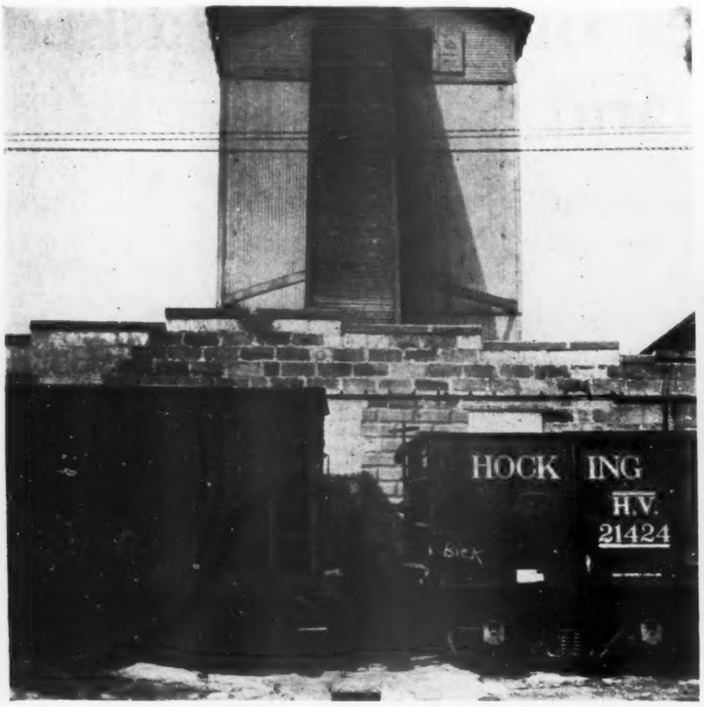
The method of handling the aggregates is excellent. These are received in hopper-bottom cars which dump into a track hopper at one end of the building. A reciprocating feeder and conveyor combined feeds the aggregate to a bucket and belt conveyor which raises it to a screw conveyor above the bins. Opening or closing a slide in the bottom of this conveyor is all that is needed to send the discharge to either the sand or the washed limestone bin.

Tests have shown that the aggregates are so evenly graded that the modulus of fineness is kept fairly uniform at 4.25.

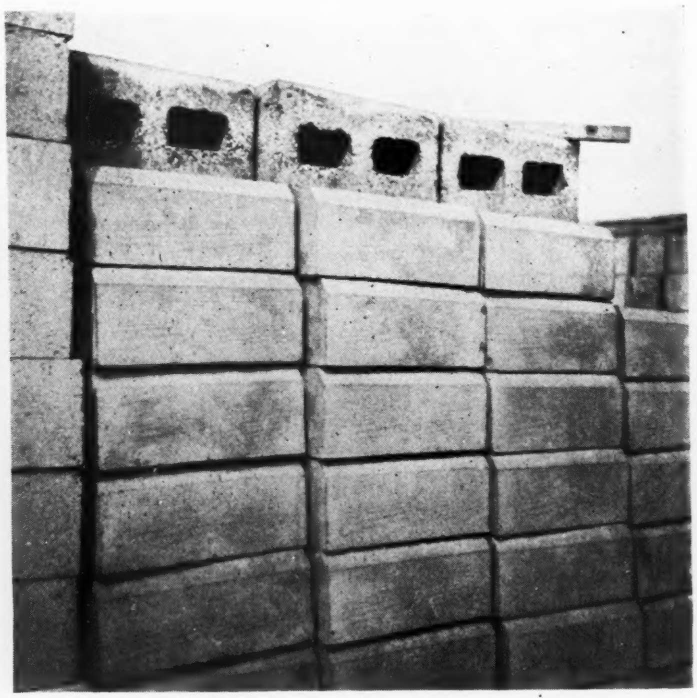
Besser mixers and Besser block machines are used. The mixers are on an upper floor and discharge into the hoppers of the block machines. The men are all thoroughly acquainted with their jobs so that the whole operation goes like clockwork. This co-ordination is necessary to keep the regular output at 4500 block per day. The business is now so well established that production goes on in winter the same as in summer. The time for the cycle of operations for making a block is only 15 sec.

The blocks on their pallets go to the kilns for steam curing on trucks and a system of parallel tracks and transfer trucks allows the trucks to be sent to any part of the yard through any kiln.

Garden ornaments, bird baths, vases and the like are also made by this plant, the usual method of hand molding in iron molds being employed for these.



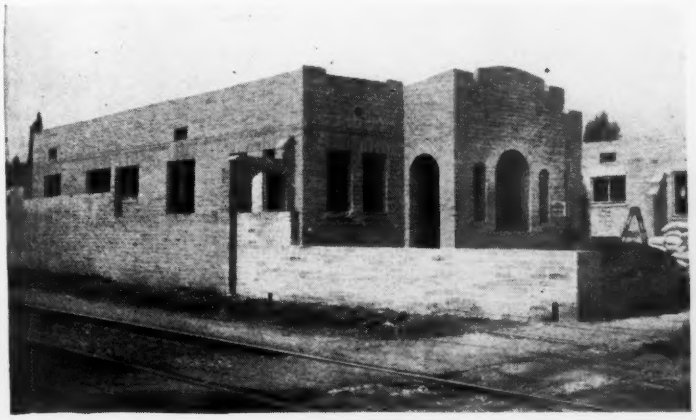
Left—The track hopper for receiving aggregates and the elevator which raises them to the bin. Right—Removing blocks from the curing room to the yard



Rock cut and panel faced blocks curing in the yard

Stone-Tile Business Good in Southern California

THREE plants in and around Los Angeles manufacturing stone-tile, a hollow concrete building unit, did a good business during 1924, and are looking forward to still better business this year. The Fillmore-Wiley Co. of Los Angeles sold 450,000 stone-tile during the first nine months of their op-



Left—Bungalow court of stone-tile in Pasadena, Calif. The photograph was taken during construction. Right—Types of the very attractive bungalows that are made of stone-tile in and around Los Angeles

eration. The construction work for which these units were used included nine store buildings, four office buildings, four factories, six garages, three warehouses and a number of service stations and bungalows. Builders and architects of Los Angeles are rapidly learning about concrete masonry units and for the most part favor their use in such buildings.

The Pacific Tile Co. of Pasadena sold 522,000 stone-tile during 1924, three-fourths of these being sold in the last six months. They estimate that between 800,000 and 900,000 tile will be sold this year.

The Concrete Brick and Tile Co. of Glendale, a suburb of Los Angeles, did a business correspondingly well since the opening of their plant last spring.

Show Up Well in Test

A comparative test was recently made of three piers, one each constructed of common clay brick, clay tile and stone-tile. The stone-tile and clay tile piers were 12 in. square and the brick pier 13 in. square, all 5 ft. high. The same mortar was used in all the piers and the structures tested for compressive strength.

The clay tile pier failed under a load of 35 tons, the clay brick pier 50 tons and the stone-tile pier 75 tons. The stone-tile used were ordinary stock material the common brick and clay tile purchased from a local dealer the tests made by the Industrial Testing Laboratory of Los Angeles. Copies of the report of the laboratory making these tests are here given in full.

INDUSTRIAL TESTING LABORATORY
Testing Engineers—Chemical Engineers
1300-2-4-6 South Los Angeles Street
P. O. Box 1041, Arcade Station
Los Angeles, Calif.
February 17, 1925.

COMPRESSION TEST ON STONE-TILE PILLAR

Laboratory No. 11180. Submitted on January 19, 1925. Submitted by Pacific Stone-Tile Co., Inc., 2330 East Colorado street, Pasadena, Calif. Identification: Stone-tile sampled by Industrial Testing Laboratory (CSH) January 19, 1925, at the plant of Pacific Stone-Tile Co., Inc., North Santa Anita avenue. Tile made December 13, 1924.

The pillar was erected so as to represent a 12-in. section of a 12-in. wall. Date erected: January 20, 1925. Date tested: February 17, 1925.

Mortar Used: Three parts sand, by volume. One part cement, by volume. (Standard Normal Portland Cement.)

One part hydrated lime, by volume. Water sufficient to give a plastic mass.

Size of Pillar: 12x12x55½ in. Number of 6-in. tile in pillar, 30.

Compression Test:

Gross area under compression, in square inches	141.0
Net area under compression, in square inches	99.6
Maximum load to destruction, in pounds	150,000
Gross load, pounds per square inch	1,064
Net load, pounds per square inch	1,506

Respectfully submitted,
(Sgd.) Industrial Testing Laboratory.
Members American Society for Testing Materials.

INDUSTRIAL TESTING LABORATORY
Testing Engineers—Chemical Engineers
1300-2-4-6 South Los Angeles Street
P. O. Box 1041, Arcade Station
Los Angeles, Calif.
February 20, 1925.

COMPRESSION TEST ON CLAY TILE PILLAR

Laboratory No. 11211. Submited on January 22, 1925. Submitted by Pacific Stone-Tile Co., Inc., 2330 East Colorado, Pasadena, Calif. Identification: Common clay tile.

The pillar was erected so as to represent a 12-in. section of a 12-in. wall. Date erected: January 22, 1925. Date tested: February 20, 1925.

Mortar Used: Three parts sand, by volume. One part cement, by volume. (Standard Normal Portland Cement.)

One part hydrated lime, by volume. Water sufficient to give a plastic mass.

Size of Pillar: 11⅞ by 12¼ in. by 5 ft. Number of clay tile used in pillar, in pairs placed end on end, 10.

Compression Test:

Gross area under compression, in square inches	139.5
Net area under compression, in square inches	64.1
Maximum load to destruction, in pounds	76,000
Gross load, pounds per square inch	545
Net load, pounds per square inch	1,186

Respectfully submitted,
(Sgd.) Industrial Testing Laboratory.
Members American Society for Testing Materials.

INDUSTRIAL TESTING LABORATORY
Testing Engineers—Chemical Engineers
1300-2-4-6 South Los Angeles Street
P. O. Box 1041, Arcade Station
Los Angeles, Calif.
March 4, 1925.

COMPRESSION TEST ON COMMON CLAY BRICK PILLAR

Laboratory No. 11306. Submitted on February 3, 1925. Submitted by Pacific Stone-Tile Co., Inc., 2330 East Colorado, Pasadena, Calif. Identification: Common clay brick. Purchased by Industrial Testing Laboratory in open market.

The pillar was erected so as to represent, as closely as possible, a 12-in. section of a 12-in. wall. Date erected: February 4, 1925. Date tested: March 4, 1925.

Mortar Used: Three parts sand, by volume. One part cement, by volume. (Standard Normal Portland Cement.)

One part hydrated lime, by volume. Water sufficient to give a plastic mass.

Size of Pillar: 13¼ by 13¼ in. by 4 ft. 9½ in. Number of bricks used, 4½ bricks to the layer, 21 layers high, 94½ bricks.

Compression Test:

Gross area under compression, in square inches	175.6
Net area under compression, in square inches	153.0
Maximum load to destruction, in pounds	100,000
Gross load, pounds per square inch	569
Net load, pounds per square inch	653

Respectfully submitted,
(Sgd.) Industrial Testing Laboratory.
Members American Society for Testing Materials.

Edison Cement Improves Plant

THE Public Service Production Co. has received from the Edison Portland Cement Co. a contract to design and construct three concrete packing houses and a concrete bag house at the company's plant at New Village, near Phillipsburg, N. J., on the Lackawanna R. R.

The packing houses will have a combined capacity of 10,000 bbl. a day. The bag house, which will be 240 ft. long two stories high will hold 2,000,000 bags. The empty bags will be taken on the railroad to the bag house, where they will be cleaned and sewed, transported on electric trucks to the elevator and carried to the second story. Thence the bags will be taken to the packing house over the bridges connecting the bag house with the packing houses, and loaded for shipment.—*Jersey City (N. J.) Journal.*

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.

Commission Holds Kansas Gas-Belt Cement Group Intact

IN discussing No. 14801, Missouri Portland Cement Co. vs. Atchison, Topeka & Santa Fe et al. and No. 14911, Lehigh Portland Coment Co. vs. same, the Interstate Commerce Commission reiterated the views, expressed in the Western Cement case, 48 I. C. C. 201 and Iola Cement Mills Traffic Association vs. A. W. Ry. Co., 87 I. C. C. 451, that the gas-belt group should not be broken up.

Commissioner Esch, author of the report, said the most important question presented by the complaints in both interstate and intrastate cases was the propriety of continuing the grouping of the mills in the Kansas gas belt. Complaints in the two cases before the Federal commission, he said, sought to break up that group and that their evidence was along the same line. He referred to it as complainants' evidence, irrespective of the particular complainant which introduced it. When necessary to make specific reference to either complainant, he had done so by referring to the point at which its mill was located. The mill of the Missouri Portland Cement Co. is at Sugar Creek, Mo., also known as Cement City, a point about 13 miles from Kansas City on the Santa Fe. The plant of the Lehigh company is at Iola, Kans.

The Missouri company's complaint alleged the rates on cement from Sugar Creek to points in Kansas and Dewey, Okla., were unreasonable, unjustly discriminatory and unduly prejudicial. The Lehigh alleged the rates from Iola to destinations in Western Trunk Line territory were unreasonable, unjustly discriminatory, and unduly prejudicial in comparison with the rates from other producing mills in the Kansas gas-belt group including Dewey, and from Sugar Creek, Bonner Springs, Kans., Prospect Hill, Continental, St. Louis, Hannibal and Illasco, Mo., Des Moines, Gilmore City and Mason City, Ia., and Superior, Neb.

Nominally it was a fight between the complaining mills and the carriers. Actually it was a contest between the mills over the question of grouping. Mr. Esch said the defendants took little part in the controversy between the mills, one of them taking a strictly neutral attitude, while the others recommended that the grouping be continued. They expressed the view that the best interests of both carriers and shippers would be served by a continuance of the group. Seemingly the burden of defending the grouping was assumed by the Iola Cement Mills Traffic Association, an intervener, and Mr. Esch referred to it as "the association" and reviewed, at length, what it offered in support of the grouping. The complainants intervened in each other's cases. Mr. Esch treated them as urging the same thing, the disruption of the group and the placing of each mill upon its own mileage.

Grouping of the gas-belt mills, the report said, was voluntarily established by the carriers. The first mill was built at Iola in 1900. As new mills were located, it said, they were included in the group at a common rate. As now constituted it embraced six points in Kansas, Iola, Mildred, Humbolt, Chanute, Fredonia and Independence, and one, Dewey, in Oklahoma, just across the state line. Mr. Esch said the mills were, on an average, 18 miles apart. North and south the group is 107 miles long.

Commissioner Esch said the grouping of the gas-belt mills appeared to have been generally satisfactory to all the mills in the group until the mill at Iola was purchased by a company which operated numerous other mills at various points throughout the country. All the other mills in the group, he added, were opposed to breaking it up. He said the complainants contended the Commission erred in the Western Cement case, in which the group was continued "and ask that the rates be based strictly on the distances from each mill rather than the average distances from all the mills or from a point which is representative of the average." In disposing of the case the Commission siad:

The record does not indicate that the Sugar Creek complainant would benefit from a breaking up of the gas-belt group, and any benefit the Iola complainant might gain would be to only a limited territory, whereas some of the other mills in the group would be seriously injured, and all of them are strongly opposed to breaking up the group. In the Iola Cement Mills Traffic Association vs. A. W. Ry. Co., supra, we required the grouping of the gas-belt mills, including Dewey, in respect of southbound traffic into Oklahoma, and the Oklahoma commission has adjusted the intrastate rates from Dewey on the same basis. Both the Kansas and Oklahoma commissions favor the continuance of the group basis, and we would not be justified in breaking it up in the absence of some compelling reason.

Sugar Creek complains of the rate of 11 cents from that point to Forty-first and State Line Streets, which will hereinafter be referred to as Forty-first Street, a point of delivery on the Missouri and Kansas, an electric line, in that part of Kansas City known as Rosedale. Team track delivery is desirable at Forty-first street. Traffic from Sugar creek to Forty-first street is routed over the Santa Fe to Olathe, Kans., and thence St. Louis-San Francisco to Lenexa, Kans., at which point it is delivered to the Missouri & Kansas. The distance over this route is 63 miles, but the short route is approximately 35 miles. The scale rate II for that distance is 8.5 cents and the scale III rate 9.5 cents.

We find that the rates assailed in both complaints are not unreasonable, unjustly discriminatory, or unduly prejudicial, except the rate from Sugar Creek to Forty-first is and for the future will be unreasonable to the extent it exceeds 8.5 cents, and the rates from the gas-belt mills should be readjusted so as to confine the group basis to interstate destinations beyond 80 miles from Chanute. Defendants will be expected to revise their rates in accordance with these findings without an order.—*The Traffic World.*

New North Dakota Sand and Gravel Rates

CHANGES in interstate freight rates on sand and gravel shipped in North Dakota have been published by the Great Northern, Northern Pacific and Soo Line railroads, effective August 3. Under the new tariffs the rate on short hauls will be reduced, while an increase will be made on hauls of over 125 miles.

The new tariffs do not affect the present rate of three cents a hundred pounds on sand and gravel from Arvilla and Reynolds to Grand Forks, N. D., but does cut the present rate of five cents from Hillsboro to Grand Forks down to 3½ cents a hundred. It is from these three points that much of the Grand Forks sand and gravel is received.

The following table shows present and proposed rates in cents per hundred pounds:

Distance	Present	Proposed
5 miles	3½	3½
10 miles	3½	3½
15 miles	4	3½
20 miles	4	3½
25 miles	4	3½
30 miles	4	3½
35 miles	5	3½
40 miles	5	3½
45 miles	5	3½
50 miles	5	3½
75 miles	6½	5
100 miles	7	6
125 miles	7	7
150 miles	7	8
175 miles	8	8½
200 miles	8	9
225 miles	8½	9½
250 miles	9	10

—*Grand Forks (N. D.) Herald.*

Protest Proposed Increase in Sand and Gravel Rates

PROTEST against increased rates proposed by the railroads on sand and gravel shipped from Montgomery, Ala., to Atlanta, Ga., and petition for their suspension has been filed with the Interstate Commerce Commission by the transportation bureau of the Montgomery chamber of commerce. The tariff increasing rates is to become effective August 1 and the increase is on an average of about 40%.

The chamber of commerce asks that application of the rates be suspended pending investigation into their reasonableness and propriety. The petition sets forth that approximately $1,000,000 is invested in the sand and gravel industry in Montgomery, that Montgomery is the largest producing point in the South for sand and gravel and Atlanta is Montgomery's largest market. It is claimed that should the proposed rates become effective, Montgomery will be practically eliminated from the Atlanta market.

The chamber of commerce also claims that the proposed rates are unreasonable and in violation of the interstate commerce act.—*Montgomery (Ala.) Advertiser.*

Seek Lower Rates for Idaho Phosphate Rock

PRACTICALLY undeveloped phosphate rock deposits in southeastern Idaho offer more tonnage to railroad lines than all other non-metallic resources of the state combined, it is declared by Francis A. Thomson, dean of the school of mines at the University of Idaho, in a letter to the Union Pacific system as a plea against present rates which he declares are "impossible."

"The solution of this problem in regard to phosphate deposits," Mr. Thomson declares, "would furnish your system, I am satisfied, more tonnage than all the other non-metallic resources of Idaho put together."—*Pocatello (Idaho) State Journal.*

Agreement Reached on New Aggregate Rates for Illinois and Indiana

NEW freight rates on sand gravel, crushed stone and allied materials from northern Illinois and central Indiana producing points to central Illinois common points will become effective December 1 as the result of an agreement announced by representatives of the joint conference of producers and carriers held at the Great Northern Hotel, Chicago, July 29, 30, 31 under the direction of Burton Fuller, attorney for the Interstate Commerce Commission.

The committee's report was the result of an investigation made after the Interstate Commerce Commission had suspended an adjusted rate proposed by the carriers. This rate sought to eliminate discrimination in freight charges existing between railroads from the central Indiana producing fields and those from the northern Illinois producing points. Objections to it were made by the Illinois Commerce Commission, which refused to recognize any increase in the intrastate rates because of its possible effect on the status of road building contracts being carried out under the supervision of the State Highway Commission.—*Chicago Journal of Commerce.*

Nebraska Gravel Rates

THE Nebraska State Railway Commission has ordered the cancellation of all rates on sand and gravel within the Lincoln-Omaha zone which cover shipments from one town to another in the district outside of Lincoln and Omaha that are less than the distance tariff. This is in settlement of a controversy between sand men and the railroads. In order to give them access to the principal markets, Lincoln and Omaha, the commission, some years ago, provided a flat rate of three cents a hundred on all shipments from pits to either city or to points intermediate between the pit and the two cities. It now holds that these rates do not apply on shipments from one town to another within the zone.—*Sioux City (Iowa) Tribune.*

Railroads Seek Old Montana Cement and Aggregate Rates

SIGNED by the heads of 12 railroads operating in Montana, an application has been made to the Montana Railroad Commission for the restoration to the old rate basis, subject to the general 10 per cent reduction in rate on all commodities of July 1, 1922, of the Montana rates on cement, sand, gravel and crushed rock.

It is shown that under an order of the Montana commission of April 28, 1921, these railroads published reduced rates on these four commodities for single or joint line hauls between points within the state to meet an unsatisfactory economic condition existing in the state. These rates, which were to have expired November 20, 1921, were extended by the commission and are still in effect.

The railroads claim that the condition which prompted the making of these rates has been relieved and they desire the rates be put back to their former level. The matter was set for hearing before the commission for July 31.—*Billings (Mont.) Gazette.*

National Standards for Shafting and Keys

TWO important dimensional standards dealing with cold-finished shafting, and square and flat shafting keys, recently approved as "Tentative American Standards" by the American Engineering Standards Committee, have just been published by the American Society of Mechanical Engineers, the sponsor, and are ready for distribution.

The standards for shafting and keys, known as B 17a and B 17b respectively, are the first dimensional standards having national approval to be published in this country in the single sheet form. They may be secured from the American Engineering Standards Committee, 29 West 39th street, New York City, at a price of 20 cents per copy.

Public Versus Private Ownership of Public Utilities

THE affirmative argument for private ownership of the subject "Public vs. Private Ownership of Public Utilities," by Arthur Williams, presented during a conference of the League of Industrial Democracy held at Camp Taminent, near Bushkill, Penn., on June 27, has been published in the form of a booklet. In it Mr. Williams gives his opinions as to the trend of modern industrialism and attempts to find the ultimate objectives causing these issues between public and private ownership of the sources of wealth production. He upholds his points with results obtained under the different systems.

Expect Twenty Colleges at Chemical Exposition

ABOUT 20 leading American colleges and universities have filed applications for their students of chemistry and chemical engineering to take the one week course of intensive training in practical technique of chemical engineering to be held in conjunction with the Tenth Exposition of Chemical Industries at the Grand Central Palace, New York, during the week of September 28 to October 3. More than three hundred students are expected to enroll before the closing date. All students of recognized colleges, as well as practicing chemical engineers, who desire to brush up on fundamentals, are eligible to take the course, which is without cost.

Interstate Molding Sand Rate

A FINDING of non-justification has been made in I. and S. No. 2397, sand and gravel from New Jersey to New York and Pennsylvania points, mimeographed, as to proposed increased rates on molding sand from Mt. Holly, Hainesport and Masonville, N. J., to Buffalo and Rochester, N. Y., and points taking the same rates. It has ordered the suspended schedules cancelled and the proceeding discontinued. Sand dealers at Mt. Holly and Hainesport protested and procured the suspension of the schedules. The protestants objected because, as they said, the proposed increases would break the parity in respect of rates to the Buffalo-Rochester group which had existed between Hainesport and the northern New Jersey points for a considerable period.—*Traffic World.*

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	1.00	......	1.75	1.50	1.50	1.50
Eastern Pennsylvania	1.35	1.35	1.45	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30	1.30	1.25
Northern New Jersey	1.60	1.50@1.80	1.80@2.00	1.40@1.60	1.40@1.60	......
Prospect, N. Y.	1.00	1.40	1.40	1.30	1.30	......
Walford, Penn.	1.00	1.30	......	1.50h	1.50h	......
Watertown, N. Y.	.50	......	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alton, Ill.	1.85	......	1.85	1.50	......	
Bloomville, Middlepoint, Dunkirk, Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind.	1.00	1.10	1.10	1.00	1.00	1.00
Buffalo and Linwood, Iowa	1.00	......	1.15	.95	1.00	1.00
Chicago, Ill.	.80	1.00	1.00	1.00	1.00	1.00
Columbia, Krause, Valmeyer, Ill.	1.20	1.20	1.20	1.10	1.10	1.10
Cypress, Ill.	1.25	1.15	1.10	1.10	1.10	1.10
Dundas, Ont.	.70	.90	.90	.90	.90	.90
Gary, Ill.	1.00	1.37½	1.37½	1.37½	1.37½	1.37½
Greencastle, Ind.	1.30	1.15	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.05	1.05	.95	.95	.95
Northern New Jersey	1.30	......	1.80	1.60	1.40	......
River Rouge, Mich.	1.00	1.10	1.10	1.10	1.10	1.10
Sheboygan, Wis.	1.10	1.10	......	......	1.10	......
St. Vincent de Paul, Que.	.85	1.35	1.05	.95	.90	.90
Stone City, Iowa	.75	......	1.20†	1.10	1.05	......
Toronto, Ont.	1.60	1.95	1.80	1.80	1.80	1.80
Waukesha, Wis.	.90	.90	.90	.90	.90	......
Wisconsin Points	.50	......	1.00@1.15	.90@1.05	.90@1.05	......
SOUTHERN:						
Alderson, W. Va.	.60	1.60	1.60	1.50	1.40	......
Cartersville, Ga.	1.50	1.50	1.50	1.15	1.15	......
Chico, Texas	1.00	1.40	1.35	1.25	1.20	1.10
El Paso, Texas	1.00	1.00	1.00	1.00	......	......
Ft. Springs, W. Va.	.60	1.60	1.60	1.50	1.40	......
Graystone, Ala.	Crusher run fluxing stone, 1.00 per net ton					
Olive Hill, Ky.	.50@1.00‡	1.00	1.00	1.00	1.00	1.00
Rockwood, Ala.	.90	......	......	......	1.00	.90
Rocky Point, Va.	.50@1.00	1.40@1.60	1.30@1.40	1.15@1.35	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kans.	.25	2.00	2.00	2.00	2.00	1.60‖@1.80
Blue Spr'gs & Wymore, Neb.	.10	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.25	......	1.25	1.25	1.10	......
Kansas City, Mo.	1.00	1.80	1.80	1.80	1.80	1.80
Rock Hill, St. Louis Co., Mo.	1.50	1.35	1.35	1.35	1.25	1.25

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.70	1.45	1.20	1.05	......
Duluth, Minn.	.90	2.25	1.90	1.50	1.35	1.35
Dwight, Calif.	1.75	1.75	1.75	1.75	1.75	......
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
New Haven, New Britain, Meriden & Wallingford, Conn.	.80	1.70	1.45	1.20	1.05	1.05
Northern New Jersey	1.50e	2.00	1.80	1.40	1.40	......
Oakland and El Cerritto, Calif.	1.00	1.00	1.00	.90	.90	......
San Diego, Calif.	.70e	1.80f	1.60	1.40g	1.30	......
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.10	......
Springfield, N. J.	1.70	2.00	2.00	1.70	1.60	......
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	......

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley and Red Granite, Wis.—Granite	1.50	1.60	1.35	1.25	1.25	1.00
Coldwater, N. Y.—Dolomite	1.50 all sizes					
Columbia, S. C.—Granite	.50	1.75	1.75	......	1.60	......
Eastern Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia, Ga.	.75	1.75	1.60	1.25	1.25	......
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	......
Middlebrook, Mo.—Granite	3.00@3.50	......	2.00@2.25	2.00@2.25	......	1.25@2.00
Northern New Jersey (Basalt)	150	2.00	1.80	1.40	1.40	......
Richmond, Calif. (Basalt)	.75*	......	1.50*	1.50*	1.50*	......

*Cubic yd. †1 in. and less. ‡Two grades. ‖Rip rap per ton. (a) Sand. (b) to ¼ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Dust. (f) ¼-in. (g) 2-in. (h) less 10c discount.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 90% thru 100 mesh	6.00
50% thru 4 mesh	3.00
Asneville, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Branchton and Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; pulverized; 90% thru 50 mesh	1.50
Cartersville, Ga.—Analysis 68% $CaCO_3$, 32% $MgCO_3$; pulverized	3.00
50% thru 50 mesh	1.50
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Chico, Texas—90% thru 100 mesh	4.50
50% thru 100 mesh	3.50
90% thru 50 mesh	3.00
50% thru 50 mesh	2.50
90% thru 4 mesh	1.50
50% thru 4 mesh	1.25
Colton, Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk	4.00
Danbury, Conn., Rockdale and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 5% $MgCO_3$; 50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk	3.25
Dundas, Ont., Can.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$; 35% thru 100 mesh, 50% thru 50 mesh, 100% thru 10 mesh; bags, 4.75; bulk	3.00
Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; sacked	5.00
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk	2.50
Knoxville, Tenn.—Analysis, 52% $CaCO_3$, 37% $MgCO_3$; 80% thru 100 mesh; bags, 3.95; bulk	2.70
Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.10; bulk	3.60
Marion, Va.—Analysis, 90% $CaCO_3$, guaranteed; 42.5% thru 100 mesh, 11.3% thru 80, 20.2% thru 60, 22.8% thru 40, 3.2% thru 20 and under or 75% thru 40 mesh; pulverized, per ton	2.00
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 90% thru 100 mesh	3.90@ 4.50
Mountville, Va.—Analysis 76.60% $CaCO_3$, 22.83% $MgCO_3$; 50% thru 100 mesh, 100% thru 20 mesh—125-lb. hemp bags	5.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@ 2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk	3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Rocky Point, Va.—Analysis, 95% $CaCO_3$; 50% thru 200 mesh	1.75@ 2.00
Asphalt filler dust, 80% thru 200 mesh	3.00@ 3.50
Waukesha, Wis.—90% thru 100 mesh	3.70
Watertown, N. Y.—Analysis 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk	2.50
West Stockbridge, Mass.—Pulverized; paper bags, 4.10; cloth, 4.60; bulk	2.85

Agricultural Limestone

(Crushed)

Alderson, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Atlas, Ky.—Analysis over 90% $CaCO_3$; 90% thru 4 mesh	1.00@ 2.00
Bedford, Ind.—Analysis, 98.5% $CaCO_3$, 0.5% $MgCO_3$; 90% thru 10 mesh	1.50
Bettendorf, Iowa—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Blackwater, Mo.—Analysis, 99% $CaCO_3$; 100% thru 4 mesh	.60
Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	1.75
50% thru 4 mesh	1.50

(Continued on next page)

Agricultural Limestone

(Continued from preceding page)

Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh	.80
Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 90% thru 4 mesh	1.20
Cypress, Ill.—90% thru 100 mesh	1.25
50% thru 100 mesh, 90% thru 50 mesh, 50% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh	1.15
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Garrett, Okla.—All sizes	1.25
Gary, Ill. — Analysis, approx. 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh	.60
Kansas City, Mo. — 50% thru 100 mesh	1.25
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh	2.00
Screenings (¼ in. to dust)	1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk	1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh	1.85@ 2.35
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind. — Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 25 to 45% thru 100 mesh	1.60
Milltown, Ind. — Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$; 30.8% thru 100 mesh, 38% thru 50 mesh	1.45@ 1.60
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Pixley, Mo.—Analysis, 96% $CACO_3$; 50% thru 50 mesh	1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh	1.65
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk	.80@ 1.40
Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh	.75
Waukesha, Wis.—Test, 107.38% bone dry, 100% thru 10 mesh; bags, 2.85; bulk	2.10

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk	3.00
Piqua, Ohio, sacks, 4.50@5.00 bulk	3.00@ 3.50
Rocky Point, Va.—80% thru 200 mesh	3.00@ 3.50
Waukesha, Wis.—97% thru 100 mesh, bulk	[illegible]

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Glass Sand:	
Berkeley Springs, W. Va.—	2.00@ 2.25
Cedarville and S. Vineland, N. J.—	
Damp	1.75
Dry	2.25
Cheshire, Mass:	
6.00 to 7.00 per ton; bbl.	2.50
Columbus, Ohio	1.25
Estill Springs and Sewanee, Tenn.	1.50
Franklin, Penn.	2.00
Gray Summit and Klondike, Mo.	1.75@ 2.00
Los Angeles, Calif.—Washed	5.00
Mapleton Depot, Penn.	2.00@ 2.25
Massillon, Ohio	3.00
Mineral Ridge and Ohlton, Ohio	2.50
Oceanside, Calif.	3.00
Ottawa, Ill.—Chemical and mesh guaranteed	1.25
Pittsburgh, Penn.—Dry	4.00
Damp	3.00
Red Wing, Minn.:	
Bank run	1.50
Ridgway, Penn.	2.00
Rockwood, Mich.	2.75@ 3.25
Round Top, Md.	2.25
San Francisco, Calif.	4.00@ 5.00
St. Louis, Mo.	2.00
Sewanee, Tenn.	1.50
Thayers, Penn.	2.50
Utica, Ill.	1.00@ 1.15
Zanesville, Ohio	2.50
Miscellaneous Sands:	
Aetna, Ind.:	
Core, Box cars, net, .35; open-top cars	.30
Albany, N. Y.:	
Molding coarse	2.00
Molding fine, brass molding	2.25
Sand blast	3.75
Arenzville, Ill.:	
Core	.75
Molding fine	1.50@ 1.75
Beach City, Ohio:	
Core	1.75

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f. o. b. producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Attica and Franklinville, N. Y.	.75	.75	.85	.75	.75	.75
Buffalo, N. Y.	1.10	.95	....	....	.85	....
Erie, Penn.	....	1.25	....	1.50	1.75	....
Farmingdale, N. J.	.58	.48	1.05	1.20	1.10	....
Hartford, Conn.	.65*	....	....	....	....	....
Machias Jct., N. Y.	....	.75	.75	.75	.75	.75
Montoursville, Penn.	....	1.10	1.10	1.00	.90	.90
Northern New Jersey	.50	.50	1.25	1.25	1.25	....
Olean, N. Y.	....	.75	.75	.75	.75	.75
Shining Point, Penn.	....	....	1.00	1.00	1.00	1.00
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.	.60@ .85	.60@ .85	....	....	....	1.10@1.30
CENTRAL:						
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Attica, Covington and Summit Grove, Ind.	.60@ .85	.60@ .85	.75@ .85	.75@ .85	.75@ .85	.75@ .85
Barton, Wis.	....	.50	.75	.75	.75	.75
Chicago, Ill.	1.35‡	1.75‡	1.75‡	1.75‡	1.75‡	1.75‡
Columbus, Ohio	.75	.75	.50	.75	.75	.75
Des Moines, Iowa	.50	.40	1.50	1.50	1.50	1.50
Eau Claire, Wis.	.40	.40	.80	....	....	.85
Elkhart Lake, Wis.	.60	.40	.50	.50	.50	.50
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Grand Rapids, Mich.	....	.50	....	.80	.70	.70
Hamilton, Ohio	....	1.00	....	....	1.00	....
Hersey, Mich.	....	.50	....	....	....	.70
Indianapolis, Ind.	.60	.60	....	.90	.75@1.00	.75@1.00
Janesville, Wis.	....	.65@ .75	....	....	.65@ .75	....
Mason City, Iowa	.45@ .55	.45@ .55	1.35@1.45	1.45@1.55	1.40@1.50	1.35@1.45
Mankato, Minn.	....	.40	....	....	1.25	....
Milwaukee, Wis.	....	1.01	1.21	1.21	1.21	1.21
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.45@ .50	.45@ .50	....	1.25	1.25	....
Palestine, Ill.	.75	.75	.75	.75	.75	.75
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
St. Louis, Mo.	1.18	1.45	1.55	1.45	1.65	1.45c
Terre Haute, Ind.	.75	.60	.90	.75	.75	.75
Wolcottville, Ind.	.75	.75	.75	.75	[illegible]	.75
Waukesha, Wis.	....	.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.25	1.10	1.00	1.00
Yorkville, Sheridan, Oregon, Moronts, Ill.			Average .60			
Zanesville, Ohio	.70	.60	.60	.60	.90	....
SOUTHERN:						
Charleston, W. Va.		All sand, 1.40.		All gravel, 1.50.		
Chehaw, Ala.	00@ .30	....	.40	.50	....	....
Knoxville, Tenn.	1.00	1.20	....	1.20	1.20	1.20
Macon and Gaillard, Ga.	....	.50	....	.65	.65	.65
New Martinsville, W. Va.	1.00	.80@1.00	1.30	....	....	.80@ .90
Roseland, La.	.45	.40	1.75	1.25	1.00	1.00
Smithville, Texas	....	.90	.90	.90	.90	.75
WESTERN:						
Baldwin Park, Calif.	.20	.20	.40	.50	.50	....
Kansas City, Mo.	.80	.70	....	....	....	....
Los Angeles, Calif.	.50	.50	.92	.92	.92	....
Los Angeles District (bunkers)†	.80	1.30	1.30	1.30	1.30	1.30
Pueblo, Colo.	1.10*	.90*	....	1.60*	....	1.50*
San Diego, Calif.	....	.60	1.25	1.20	1.00	1.00
Seattle, Wash. (bunkers)	1.50*	1.50*	1.50*	1.50*	1.50*	1.50*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Boonville, N. Y.	.60@ .80	....	.55@ .75	....	....	1.00
Chehaw, Ala.	00@ .30	....	....	....	....	....
Des Moines, Iowa		Washed, .65; unwashed, .40 (not screened)				
Dudley, Ky. (crushed silica)	1.10	1.10	.90	.90	....	....
East Hartford, Conn.			Sand, .75 per cu. yd.			
Elkhart Lake, Wis.	.50	....	....	....	....	....
Gainesville, Texas	....	.95	....	....	....	.55
Grand Rapids, Mich.	....	....	....	.60	....	....
Hamilton, Ohio	....	....	....	....	.70	....
Hersey, Mich.	....	....	....	[illegible]	....	....
Indianapolis, Ind.		Mixed gravel for concrete work, .65				
Lindsay, Texas	....	1.10	....	....	....	.55
Macon, Ga.	....	.35	....	....	....	....
Mankato, Minn.			Pit run sand, .50			
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Montezuma, Ind.	....	....	....	....	....	.60
St. Louis, Mo.			Mine run gravel 1.55 per ton			
Shining Point, Penn.			Concrete sand, 1.10 ton			
Smithville, Texas	.50	.50	.50	.50	.50	.50
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Winona, Minn.	.60	.60	.60	.60	.60	.60
York, Penn.	1.10	1.00	....	....	....	....
Zanesville, Ohio	....	....	....	....	....	.55

*Cubic yd. †Include freight and bunkerage charges. ‡Delivered on job. (a) ¾ in. down. (b) River run. (c) 2½-in. and less.

Miscellaneous Sands

(Continued from preceding page)

- Furnace lining 2.50
- **Molding fine and coarse 2.00**
- **Traction unwashed and screened 1.75**

Cheshire, Mass.—Furnace lining, molding fine and coarse 5.00
- **Sand blast 5.00@ 8.00**
- Stone sawing 6.00

Columbus, Ohio:
- Core .30@ 1.50
- Traction .30@ 1.25
- Molding coarse 1.25@ 1.50
- Stone sawing 1.50
- Molding fine 1.75@ 2.00
- Furnace lining 2.00@ 2.50
- Sand blast 3.00@ 4.00
- Brass molding 2.00

Eau Claire, Wis.:
- Sand blast 3.00@ 3.25

Elco, Ill.:
- **Ground silica per ton in carloads 22.00@31.00**

Elnora, N. Y.:
- Brass molding 1.75@ 2.00

Estill Springs and Sewanee, Tenn:
- **Molding fine and core 1.25**
- **Roofing sand, sand blast, traction 1.35@ 1.50**

Franklin, Penn.:
- Core, furnace lining, molding fine and coarse 1.75

Gray Summit and Klondike, Mo.:
- Stone sawing 1.00
- Core, furnace lining, molding fine, roofing sand **1.75**
- **Brass molding 1.75@ 2.00**
- **Sand blast 2.00**

Joliet, Ill.:
- **No. 2 molding sand; also loam for luting purposes and open-hearth work .65@ .85**

Kasota, Minn.:
- **Stone sawing 1.00**

Mapleton Depot, Penn.:
- Molding fine and coarse, traction 2.00

Massillon, Ohio:
- Core, furnace lining, molding fine and coarse 2.50
- Traction 2.00

Michigan City, Ind.:
- Core, in open car, .30; in box car .35
- Traction .25

Mineral Ridge and Ohlton, Ohio:
- Furnace lining, molding coarse, sand blast, traction (damp) 1.75
- Roofing sand (damp) 1.75@ 2.00
- Core, molding fine (damp) 2.00

Montoursville, Penn.:
- Traction 1.10
- Core 1.25@ 1.50

New Lexington, Ohio:
- **Molding fine 2.00**
- **Molding coarse 1.50**

Oceanside, Calif.:
- **Roofing sand 3.50**

Ottawa, Ill.:
- Core, furnace lining and traction 1.00
- Roofing sand 1.25@ 2.50
- Sand blast 4.00
- Stone sawing 3.00
- Molding coarse (crude silica, not washed or dried) .75@ 1.00

Red Wing, Minn:
- **Core, furnace lining, stone sawing 1.50**
- **Molding fine and coarse, traction 1.25**
- **Sand blast 3.50**
- **Filter sand 3.75**

Ridgway, Penn.:
- Molding fine and coarse 1.25@ 1.50
- Furnace lining (loam sand) 1.50
- Core 1.75@ 2.00

Round Top, Md.:
- Core 1.60
- **Traction 1.75**
- **Roofing sand 2.25**

St. Louis, Mo.:
- **Core 1.00@ 1.75**
- **Furnace lining 1.50**
- **Molding fine 1.50@ 2.50**

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Emporium and Dubois, Penn.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Reading, Pa.	2.50	1.00	....	1.25	....	....	....
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05	1.45	1.75	1.45	....	1.45	1.45
Jackson, Ohio	....	1.05	....	1.30	1.05	1.30	1.30
Toledo, Ohio	1.50	1.25	1.25	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.	....	1.55	....	1.55	1.55	1.55	1.55
Ensley and Alabama City, Ala	2.05	.80	1.25	1.15	.90	.90	.80
Longdale, Roanoke, Ruessens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.	....	....	12.00	....	....	....	....	2.20
Buffalo, N. Y.	....	12.00	12.00	12.00	....	....	....	....
Lime Ridge, Penn.	....	....	....	....	....	....	5.00a	....
West Stockbridge, Mass. (f)	13.00	10@11.00	5.00	....	....	....	....	2.25t
Williamsport, Penn.	....	....	10.00	....	....	....	6.00	....
York, Penn.	....	10.50	10.50	11.50	....	....	8.50	1.65i
CENTRAL:								
Cold Springs, Ohio (f)	....	10.00	....	....	....	....	9.00	....
Delaware, Ohio	12.50	10.00	9.00	10.50	9.00	15.00	9.00	1.50
Gibsonburg, Ohio	12.50	....	....	....	....	....	....	....
Huntington, Ind.	12.50	10.00	9.00	....	....	....	....	....
Luckey, Ohio (f)	12.50	....	....	....	....	....	....	....
Marblehead, Ohio	....	10.00	9.00	....	....	....	9.00	1.50c
Marion, Ohio	....	10.00	9.00	....	....	....	9.00	1.50c
Sheboygan, Wis.	....	....	....	....	....	....	9.50	....
Tiffin, Ohio	....	....	....	....	9.00	....	....	....
White Rock, Ohio	12.50	....	....	....	9.00	11.00	....	....
Woodville, Ohio (f)	12.50	10.00	9.00	....	9.00	10.501	9.00	1.50
SOUTHERN:								
El Paso, Texas	....	....	....	....	....	....	10.00	1.75
Graystone, Wilmay and Landmark, Ala.	12.50	11.00	....	11.00	....	10.00	8.50	....
Karo, Va.	....	10.00	9.00	....	....	....	7.00g	1.65h
Knoxville, Tenn.	20.50	11.00	....	....	....	1.35	8.00	1.50
Ocala and Zuber, Fla.	13.00	12.00	10.00	....	....	1.50	12.00	1.70
Varnons, Ala. (f)	....	10.00p	10.00p	....	....	....	8.00q	1.40r
WESTERN:								
Kirtland, N. M.	....	....	....	....		....	15.00	....
San Francisco, Calif.	20.00o	20.00o	15.00	20.00o	....	....	14.50o	2.40o

†50-lb. paper bags, burlap 24.00; (a) run of kilns; (c) wooden, steel 1.70; (d) wood; (e) per **180-lb. barrel; (f) dealers' prices; (g) to 9.50; (h) to 1.75; (i) 180-lb. bbl.; 2.65, 280-lb. bbl.;** (l) 80-lb. paper; (m) finishing lime, 3.00 common; (n) common lime; (o) high calcium; (p) to 11.00; (q) to 8.50; (r) to 1.50; (s) in 80-lb. burlap sacks; (t) common, 2.50 plastering, 3.00 finishing; (u) two 90-lb. bags.

Miscellaneous Sands

(Continued)

- **Molding coarse 1.25@ 1.75**
- **Roofing sand 1.75**
- **Sand blast 3.50@ 4.50**
- **Stone sawing 1.25@ 2.25**
- **Traction 1.25**
- **Brass molding 2.00@ 3.00**

San Francisco, Calif:
- (Washed and dried) — Core, sand blast and brass molding 3.50@ 5.00
- **Furnace lining and roofing sand 3.50@ 4.50**
- **Molding fine and traction 3.50**
- **Molding coarse 4.50**
- **(Direct from pit)—Core and molding fine 2.50@ 4.50**

Sewanee, Tenn.:
- **Molding fine and coarse, roofing sand, sand blast, stone sawing, traction, brass molding 1.25**

Skerkston, Ont.:
- Traction (lake sand) .65

Tamalco, Ill.:
- Molding coarse 1.25@ 1.50

Tamms, Ill.:
- Ground silica per ton in carloads 20.00@31.00

Thayers, Penn.:
- **Core 2.00**
- **Molding fine and coarse 1.25**
- **Traction 2.25**

Utica, Ill.:
- Core, furnace lining, brass molding (crude) .60@ 1.15
- Molding fine and coarse (crude) .55@ 1.15
- Traction 1.00
- Roofing sand 1.00@ 2.75
- Stone sawing 1.00@ 2.85
- Sand blast 2.85@ 3.50
- Core .65
- Molding fine .60
- Furnace lining and molding coarse .70

Utica, Penn.:
- Core 2.00
- Molding fine and coarse 1.75

Warwick, Ohio.:
- **Core, molding fine and coarse (green) 1.75**
- **Core, molding fine (dry) 2.25**

Zanesville, Ohio:
- Core and molding coarse 1.50@ 1.75
- Molding fine, brass molding 1.75
- Traction 2.50

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point

Baltimore, Md.:
- **Crude talc (mine run) 3.00@ 4.00**
- **Ground talc (20-50 mesh), bags 10.00**
- **Cubes 55.00**
- **Blanks (per lb.) .08**
- **Pencils and steel workers' crayons, per gross 1.25**

Chatsworth, Ga.:
- Ground (20-50 mesh), bags 10.00
- Ground (150-200 mesh), bags 12.00
- Pencils and steel workers' crayons, per gross 1.50

Chester, Vt.:
- Ground (150-200 mesh), bags 9.00@15.00
- **Bags 10.00@11.00**

Chicago and Joliet, Ill.:
- **Ground (150-200 mesh), bags 30.00**

Emeryville, N. Y.:
- **(Double air floated) including bags;**
- 325 mesh 14.75
- 200 mesh 13.75

Hailesboro, N. Y.:
- Ground white talc (double and triple air floated) including bags, 350 mesh 15.50@20.00

Henry, Va.:
- **Crude (mine run) 3.50@ 4.00**
- **Ground (150-200 mesh), bags 9.00@15.00**

Keeler, Calif.:
- **Ground (200-300 mesh), bags 20.00@30.00**

Natural Bridge, N. Y.:
- Ground talc (300-325 mesh), bags 13.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

- Gordonsburg, Tenn.—B.P.L. 68-70% 4.00@ 5.00
- Mt. Pleasant, Tenn.—B.P.L. 72% 5.50@6.00
  - B.P.L. 75% 6.00@ 6.50
  - B.P.L. 75% (free of fines for furnace use) 6.50@ 6.75
- **Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L. 5.50**
- **Twomey, Tenn.—B.P.L. 65%, 2000 lb. 7.00@ 8.00**

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12, 24x14	10.20	10.00	8.10	7.80
22x12	10.80	10.00	8.40	8.75
22x11	10.80	10.50	8.40	8.75
20x12	12.60	10.50	8.70	8.75
20x10, 18x10, 18x9, 18x12	12.60	11.00	8.70	8.75
16x10, 16x9, 16x8, 16x12	12.60	11.00	8.40	8.75
14x10	11.10	11.00	8.10	7.80
14x8	11.10	10.50	8.10	7.80
14x7 to 12x6	9.30	10.50	7.50	7.80
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

Ground Rock
(2000 lb.)

Gordonsburg, Tenn.—B.P.L. 68-72%..	4.00@ 5.00
Mt. Pleasant, Tenn.—B.P.L. 65%	6.50
13% phosphorus, 95% thru 80 mesh	5.75
Twomey, Tenn.—B.P.L., 65%	7.00@ 8.00

Florida Phosphate
(Raw Land Pebble)
Per Ton

Florida—F. O. B. mines, gross ton, 68/66% B.P.L., Basis 68%	2.50
70% min, B.P.L., Basis 70%	2.75
72% min. B.P.L., Basis 72%	3.00
75/74% B.P.L., Basis 75%	4.00

Fluorspar

Fluorspar, 85% and over calcium fluoride, not over 5% silica, per net ton, f.o.b. Illinois and Kentucky mines	16.00
No. 2 lump, per net ton	19.00
Fluorspar, foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Philadelphia, duty paid, per net ton	15.00@16.00
Fluorspar, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, per net ton, f.o.b. Illinois and Kentucky mines	32.50

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Barton, Wis., f.o.b. cars		10.50
Brandon, Vt. — English pink and English cream	*11.00	*11.00
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries		17.50
Crown Point, N. Y. — Mica Spar		8.00@10.00
Easton, Penn., and Phillipsburg, N. J.— Green granite	12.00@16.00	12.00@16.00
Haddam, Conn. — Felstone buff	15.00	15.00
Harrisonburg, Va.—Blk marble (crushed, in bags	†12.50	†12.50
Ingomar, Ohio		10.00@20.00
Middlebrook, Mo.—Red		20.00@25.00
Middlebury, Vt. — Middlebury white	‡9.00	‡9.00
Milwaukee, Wis.		14.00@34.00
Newark, N. J.—Roofing granules		7.50
New York, N. Y.—Red and yellow Verona		32.00
Red Granite, Wis.		7.50

Sioux Falls, S. D.	7.50	7.50
Stockton, Cal. — "Nat-rock" roofing grits		†12.00
Tuckahoe, N. Y.		12.00
Villa Grove, Colo.		13.00
Wauwatosa, Wis.		16.00@45.00
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00

†C.L. Less than C. L., 15.50.
*C.L. including bags; L.C.L. 12.50.
‡C.L. including bags; L.C.L. 10.00.

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	26.00@32.00
Baltimore, Md. (Del. according to quantity)	16.00@16.50	22.00@50.00
Ensley, Ala. ("Slag-tex")	12.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Milwaukee, Wis.	15.00@16.00	30.00@42.00
Omaha, Neb.	18.00	30.00@40.00
Philadelphia, Penn.	†15.25	‡21.50
Portland, Ore.	17.00	25.00@45.00
Prairie du Chien, Wis.	14.00	25.00@32.00
Rapid City, S. D.	18.00	25.00@45.00
Watertown, N. Y.	20.00	35.00
Wauwatosa, Wis.	14.00	20.00@42.00
Winnipeg, Man.	14.00	22.00

†Gray. ‡Red.

Sand-Lime Brick

Prices given per 1000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass.	14.00@15.50
Brighton, N. Y.	16.75
Dayton, Ohio	12.50@13.50
Farmington, Conn.	14.00
Grand Rapids, Mich.	12.00
Hartford, Conn.	14.00
Jackson, Mich.	13.00
Lancaster, N. Y.	13.00
Michigan City, Ind.	12.00
Milwaukee, Wis.	13.00
Portage, Wis.	15.00
Rochester, N. Y (del. on job)	19.75
Saginaw, Mich.	13.00
San Antonio, Texas	13.50@15.00
Syracuse, N. Y.	*18.00
Terra Cotta, D. C.	13.50
Wilkinson, Fla.—White	13.00
Buff	17.00

*Mill price, 20.00 delivered.

Gray Klinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrated, per ton Finishing	Common
Atlanta, Ga.	22.50	14.00
Baltimore, Md.	24.25	17.85
Boston, Mass.	20.00	13.50@15.00
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	18.00
Dallas, Tex.	20.00	—
Denver, Colo.	24.00	
Detroit, Mich.	12.40	12.40
Kansas City, Mo.	19.50	18.50
Los Angeles, Calif.		18.00
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.		21.00
New Orleans, La.	24.00	16.00
New York, N. Y.	18.20	12.00@13.10
Philadelphia, Penn.	23.00	16.00
St. Louis, Mo.	23.00	19.00
San Francisco, Calif.		22.00
Seattle, Wash. (paper sacks)	24.00	—

Portland Cement

Prices per bag and per bbl. without bags net in carload lots.

	Per Bag	Per Bbl.
Boston, Mass.		2.53
Buffalo, N. Y.		2.38
Cedar Rapids, Iowa		2.44
Cincinnati, Ohio		2.47
Cleveland, Ohio		2.39
Chicago, Ill.		2.20
Columbus, Ohio		2.44
Dallas, Texas	.48¾	1.95
Davenport, Iowa		2.39
Dayton, Ohio		2.48
Denver, Colo.	.63¾	2.55
Detroit, Mich.		2.35
Duluth, Minn.		2.19
Indianapolis, Ind.		2.39
Kansas City, Mo.	54¼	2.17
Los Angeles, Calif.	.63	2.52
Louisville, Ky.		2.45
Memphis, Tenn.	.65	2.60
Milwaukee, Wis.		2.35
Minneapolis, Minn.		2.42
Montreal, Que.		1.90
New York, N. Y.		2.15
Omaha, Neb.	.62¾	2.51
Philadelphia, Penn.		2.41
Pittsburgh, Penn.		2.19
San Francisco, Calif.		2.71*
St. Louis, Mo.	.57½	2.30
St. Paul, Minn.		2.42
Seattle, Wash. (10c discount)		2.65
Toledo, Ohio		2.40

NOTE—Add 40c per bbl. for bags.

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Buffington, Ind.		1.95
Concrete, Wash.		2.35
Davenport, Calif.		2.05
Hannibal, Mo.		2.05
Hudson, N. Y.		2.45*
Leeds, Ala.		1.95
Mildred, Kan.		1.95
Nazareth, Penn.		1.95
Northampton, Penn.		1.95
Steelton, Minn.		2.00
Universal, Penn.		1.95

*Including sacks at 10c each.

Cement Products

Hawthorne tile, carload lots, f.o.b. Cicero, Ill.

	Per sq.
Red French	9.50
Green French	11.50
Red Spanish	12.00
Green Spanish	12.00

	—Cicero— Red	Green
Ridges	.25	.35
Hips	.20	.30
Ridge closers	.05	.06
Hip terminals, 3 way	1.25	1.50
Hip starters	.50	.60
Gable finials	1.25	1.50
Gable starters	.20	.30
End bands	.20	.30
Eave closers	.06	.08

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ¼x32x36". Wt. 1500 lb. Per M Sq. Ft.	⅜x32x36". Wt. 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lgths. 6'-10', 1850 lb. Per M Sq. Ft.
Centerville, Iowa	3.00	8.00	15.00	7.00	9.00	9.00	9.00		25.80	11.00			
Douglas, Ariz.			7.00		16.50		19.50			15.50			
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50		26.55	20.00			
Gypsum, Ohio‡	3.00	4.00	6.00	8.00	9.00	9.00	19.00	7.00	27.00	19.00	20.00	20.00	30.00
Hanover, Mont.				11.80									
Los Angeles, Calif.				10.90b			12.30						
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00		20.00	30.00
Portland, Colo.				10.00									
San Francisco, Calif.					16.40		17.40						
Sigurd, Utah									18.00a				
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00					28.50		34.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
*To 3.00; †to 11.00; ‖to 12.00; ‡prices per net ton, sacks extra; (a) to 21.00; (b) sacks, 12c each.

New Machinery and Equipment

The Buttress Gypsum Tile Machine

THE cuts on this page show the Buttress gypsum tile machine. This is a West Coast product and it is made by the Buttress Plaster Wall Board Machinery Co., Marsh-Strong building, Los Angeles, Calif. This machine is strictly a continuous machine, the makers saying that it will turn out tile so long as it is fed with the necessary gypsum and sawdust and the power applied.

The machine consists of a mixer, from which the molds are filled, devices for freeing the tile from the mold and a conveying system by which the tile is kept in motion from the time the gypsum sawdust mixture is filled into the mold until the block is sufficiently set to be removed by hand and placed on the rock on which it is taken to the drying and curing room. The tile are very sharp and true to shape and size, as is evidenced by the picture of the tiles in the storage room.

The makers say that the machine may be had in any desired capacity. A standard machine sells for $20,000 with a positive guarantee that it will produce 10,000 sq. ft. of tile in 10 hours with only four men.

The Buttress company also makes a full line of machinery for making gypsum lath and wall board.

In no branch of the gypsum industries has greater advance been shown than in the making of block and tile by machinery in the place of hand molding, which has resulted in the saving of labor and a better product.

The Trend to the Revolving Shovel

FOR the past 15 years the full-revolving type of shovel has been steadily but irresistibly pushing its front lines further and further into the hitherto impregnable stronghold of the old faithful shovel of the railroad type.

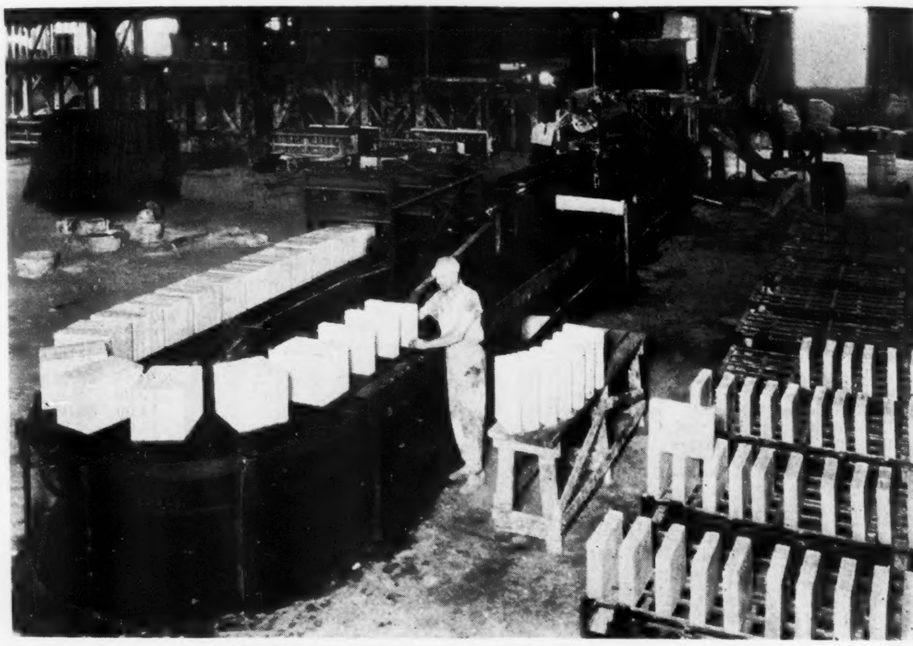
Fifteen years ago the clay pit, the gravel plant, the iron and copper mine, the quarry and the railroad job were quite securely in the possession of that sturdy old truck-mounted mill.

With the steady improvement of the "whirley" and the development of the mammoth stripper and the flexible dragline excavator, its outposts fell one by one. The gravel plant went, the clay pit followed, the 300-ton stripper made great inroads into the world's greatest open-cut operations.

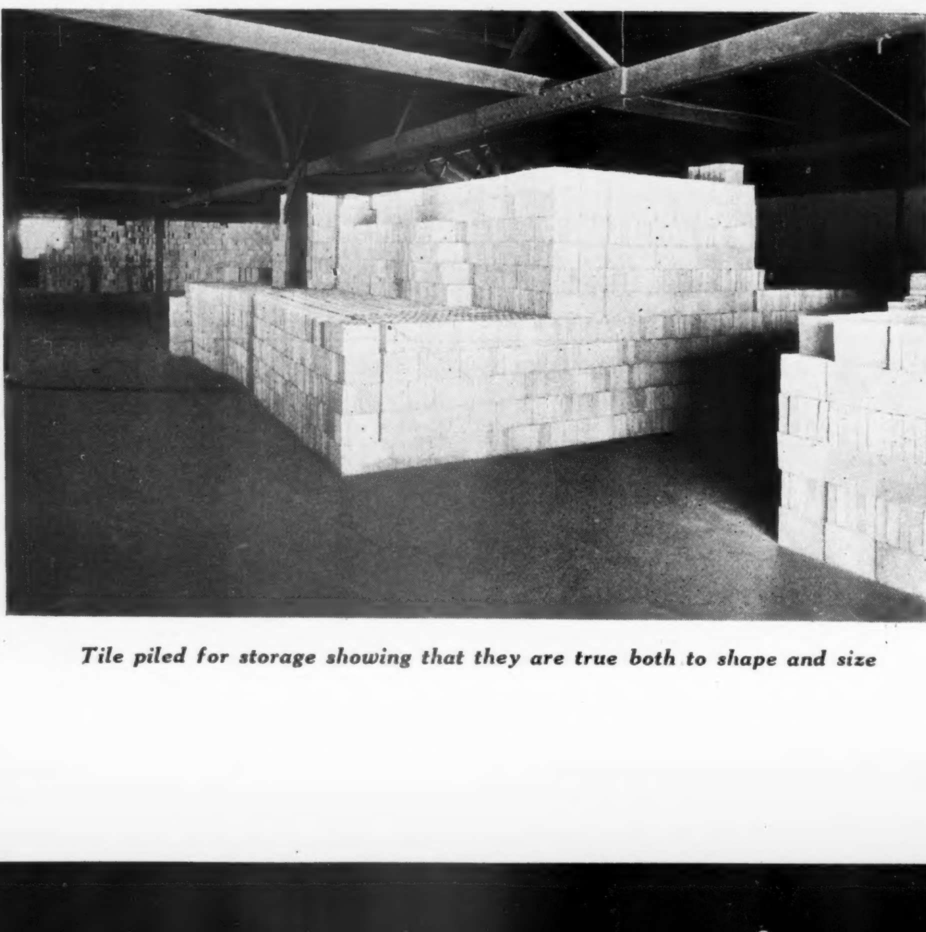
The railroad job is now tottering. Every new big contract finds a larger proportion of revolving shovels up against work on which, a decade ago, a contractor would have been discredited had he introduced other than the well-tried equipment. In the past few years the great mobility and flexibility of the revolving shovel has led to its use in growing numbers even in quarry service, despite the greater strength and power of the railroad-type machine.

Now comes the announcement of the new type of 4-yd. revolving shovel with the close-coupled strength and ruggedness of the older type combined with a power that is at last commensurate.

We have not yet seen the day when the railroad-type shovel can be totally relegated to the shelf, if we ever do. But we look upon this new machine as marking a new and a greater step forward in the development of heavy excavating machinery. It will without question of doubt open up a new field for the full-revolving machine where heavy ores and rock are encountered.—*Editorial in the "Excavating Engineer."*



The continuous tile machine in operation

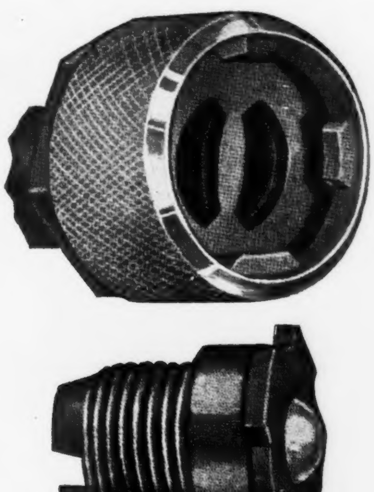


Tile piled for storage showing that they are true both to shape and size

Greasing a car with the greasing cabinet

Lincoln Greasing System for Cars

THE Lincoln greasing system is a mechanical system for greasing quarry cars. It is made by the Lincoln Steel and Forge Co., St. Louis, Mo. The cars are fitted with self-closing spring oilers. After they are so equipped they are greased from a grease pump which is actuated by compressed air.



The grease plug which is really an automatic grease valve

In the larger sizes the air is taken from the plant air lines.

If it is desired, a central greasing station may be installed at which the cars may be greased in trips as they pass the greasing machine.

The Lincoln greasing cabinet of 25-lb. capacity is a hand operated machine. It is supplied with an introductory outfit to show the advantages of mechanical greasing. It is shown in one of the pictures as in use when greasing a car.

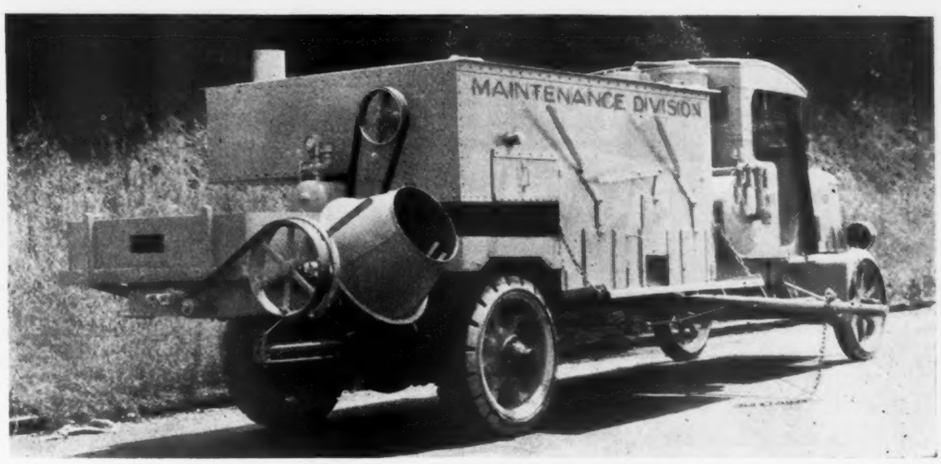
The smaller cuts show the automatic grease plug which is placed on the car and the coupler that is placed on the hose to connect it with the grease plug. The makers say that the grease plug is really a grease valve that works automatically. It allows the grease to flow into the wheel but as soon as the coupler nozzle is removed the plug closes tight keeping the grease in and the dirt out.

Specially Designed Colorado Highway Maintenance Truck

THE Colorado Highway Commission recently placed in commission a highway maintenance truck specially built by the Fageol Motors Co. of Oakland, Calif., which, in addition to carrying complete equipment for repairing and maintaining highways, has combination material bins, with capacities of 1000 lb. of cement, 1 cu. yd. sand and 2 cu. yd. of gravel or crushed stone. Gravity feed from all the bins is controlled by hand operated gates to the mixing aprons. Directly back of these bins is a rotary concrete mixer driven by an auxiliary shaft from the transmission. There is a 150 gal. steel water tank which can be filled by means of a centrifugal pump provided with a self-priming device and a suction hose.

The truck equipment also comprises an air compressor, operated by a belt from the transmission and a large assortment of chisels, tampers, a large pneumatic jack hammer, etc.

In addition to many other operations this equipment can be used economically and efficiently in repairing ruptures or breaks in reinforced or plain concrete highways or roads, using the pneumatic jack hammers to break up the damaged place, pneumatic air jet to blow out refuse, materials from the material bins, mixing same in the power driven concrete mixer.



A truck designed especially for highway maintenance

News of All the Industry

Incorporations

Spencer Gravel Co., Inc., Minden, La., $24,000.

Mount Dennis Tile and Brick Co., Ltd., Mount Dennis, Ont., $300,000.

Duntile Products Corp., 1614 South Brown street, Jackson, Mich., $10,000.

Oka Sand and Gravel Co., Ltd., Montreal, Que., has been granted a provincial license.

Breeko Concrete Products Co., Nashville, Tenn., $50,000; H. V. Hopton, Franklin road.

New Hope Gravel Co., Columbus, Miss., changed name to Alabama Gravel Co.

Nashville Concrete Products Co., Nashville, Tenn., J. C. Barker, 854 Argyle avenue.

Warrior Cement Corporation, Dover, Del., $2,-750,000. (United States Corporation Co.)

Mergerum Rock Asphalt Co., Cherokee, Ala., $24,000; Milton Yandel and T. A. Downes.

J. R. Beville Gravel Co., Inc., Havnesville, La., $25,000; J. R. Beville, B. L. Beville and others.

Super Cement Co., 833 Dime building, Detroit, Mich., $50,000 and 10,000 shares of no par value.

Carpenter Concrete Products Co., St. Petersburg, Fla., $10,000; A. A. Carpenter and George E. Brack.

Mississippi River Sand and Material Co., St. Louis, Mo., $100,000; Walter Scott, 537 Lake street.

Olentangy Stone Co., Delaware, Ohio, $20,000; S. C. Russell, D. Mildred, Stuart and Mrs. S. C. Kissner.

Shawsville Investment Co., Shawsville, Va., $25,-000; C. A. Albert, S. C. Snead and others. Will operate a stone quarry.

Zenith Limestone Co., Tulsa, Okla., increased capital from $200,000 to $250,000. (Delaware Registration Trust Co.)

Lime Rock Asphalt Co., Tampa, Fla., $100,000; R. E. Crimmins, Possonian apartments, Houston, Texas; John Riddell, New York.

Oregon Concrete Products Co., Portland, Ore., has been formed by J. E. Jacox and C. A. Lyon, with headquarters at 315 East 11th street.

Rock Hill Cement Products Co., Rock Hill, N. C., $5000; G. W. Allen, president; J. F. Healan, vice-president, secretary and treasurer.

General Land and Sand Co., Baltimore, Md., $50,000; John J. Flynn, 1707 Edmondson avenue, and others; headquarters at room 304, 5 Hopkins street.

P. J. Reinert Cast Stone Co., Huntington, W. Va., $15,000; Peter J. Reinert, Thomas W. and Decota Allen, Charles E. and Roberta O. Stafford.

Keyroid Cement Block Co., Inc., Queens, L. I., N. Y., $20,000; Donald McPherson, John J. Connoly, Frederick B. Schultz, 1061 St. Nicholas avenue, Manhattan.

Coastal Manufacturing Co., Panama City, Fla., $50,000; S. D. Cowden, Fred T. Bennett and others, and is reported to erect a plant at Millville Junction to manufacture hollow concrete tiles.

Columbia Sand, Gravel and Stone Co., Hudson, N. Y., 10,000 shares, $10 per share, 200 common, no par; C. J. Seaman, Jr., P. D. Winch and W. Traugott. (Attorneys, Coffin and Coffin, Hudson.)

Palmetto Coal and Lime Co., Fountain Inn, S. C., $60,000; T. D. Wood, president and treasurer. Will explore and develop ore, coal and limestone deposits and manufacture and deal in mineral products.

Fort Smith Sand and Gravel Co., Fort Smith, Ark., $50,000; W. B. Pattison and N. J. Robbins. Office in the Merchants National bank. Company has taken over the plant of the Big Bend Sand and Gravel Co. on Waldon road.

Maitland Sand and Gravel Co., Ltd., Port Maitland, Ont., $150,000, granted a provincial charter to deal in sand, gravel, stone and their products. Directors: E. J. Wilson, A. L. Snyder, W. J. Fisher and M. H. Finkelston of Detroit, Mich.

Claremont Brick and Cement Products, Ltd., Claremont, Ont., $150,000, granted provincial charter. Authorized to manufacture and deal in brick, tiles, cement, marl, lime, stone and artificial stone. Thos. R. Jones of Toronto is interested in the concern.

Sand and Gravel

Decoto Sand and Gravel Co., Decoto, Calif., has begun operations. Joseph Costello, owner of the San Leandro quarry, is president of the company.

Ellington Gravel Co., Wrens, Ga., is installing new machinery at its plant and expects to produce and ship 30 cars daily after work has been completed.

Uhrichsville Sand and Gravel Co., Uhrichsville, Ohio, has completed its new washed sand and gravel plant at its 20-acre deposit about a mile and a half east of Tuscarawas. The company is composed of Mr. and Mrs. T. E. Cooper, Mr. and Mrs. G. A. Roby and Loren Smith.

Stewart Sand Co., Kansas City, Mo., has purchased a new 50-ft. steel towboat for towing its barge fleet in the Missouri river. The boat is equipped with Diesel engines and will replace an old one which is no longer powerful enough for present duties. The boat will be placed in operation on arrival from Pittsburgh about September 1.

Towl, Nelson and Schwartz, Omaha, Neb., a civil engineering firm, plan to develop a deposit of sand and gravel along Howe creek, 11 miles northwest of Bloomfield, Neb., said to contain 50,000,000 tons of gravel without overburden. They are making a survey for a 15-mile railroad spur connecting the deposit with the Chicago, St. Paul, Minneapolis and Omaha R. R. at Bloomfield. Ray N. Towl is head of the concern.

Gypsum

United States Gypsum Co., Chicago, is spending about $30,000 perfecting the dust collecting system at its Oakfield, N. Y., plant.

Nephi Plaster and Manufacturing Co., Nephi, Utah, has purchased a new aerial tramway from the Interstate Equipment Co., New York. This tramway is 8700 ft. long and is designed to handle 50 tons per hour. Installation is now under way.

Quarries

Linwood Cement Co., Davenport, Iowa, has installed an additional crusher at its crushing plant at Linwood, Iowa.

Osceola White Lime Co., Osceola, Mo., is now operating its crushing plant 24 hours daily, the time being divided into three eight-hour shifts requiring about 75 men.

Cement

Monolith Portland Cement Co., Los Angeles, Calif., has increased the capacity of its plant at Monolith, Calif., from 3000 bbl. to 3500 bbl. daily and has plans to further increase production to 4000 bbl. in the near future. Coy Burnett is president of the company.

Lime

Elliston Lime Co., Helena, Mont., has installed a new 32-ton daily hydrating unit at its lime plant near Elliston, Mont. W. T. Kuehn is president and manager of the company.

Cement Products

J. M. Scott will build a cement block factory in Orlando, Fla., on a site already acquired.

Concrete Products Co., Oakland, Calif., will erect a one-story plant at High and Howard streets to cost $25,000. A. Schomig, 1268 47th avenue, is architect.

Stevenson Concrete Products Co., Toronto, Ont., are placing a "ready cut" concrete garage for quick assembly on the market. Offices are at 2 Darrell avenue.

Acme Lumber Co., Fort Pierce, Fla., has acquired a 10-acre tract at St. Lucie, Fla., and will erect on it a concrete block manufacturing plant to cost about $100,000.

Ontario Shope Brick Co., Toronto, Ont., has established a plant on Seglington avenue, Mount Dennis, Ont., for the manufacture of concrete block, tile and brick. The company has offices in the Manning Arcade, Toronto.

Spanish Building Material Co., Birmingham, Ala., has completed its plant, installed equipment and is now manufacturing concrete building units. This company was recently incorporated by Ervin Jackson, J. D. Smith and T. B. Ridout with authorized capital of $10,000.

Silica Sand

Maryland Glass Sand Co., Hancock, Md., is rebuilding its warehoues and office which were damaged by fire recently with a loss of $10,000.

Western Silica Co., Yakima, Wash., plans to rebuild a portion of its plant which was destroyed by fire recently with a loss of about $40,000, including equipment.

Personal

Alfred Mueller, former mayor of Davenport, Iowa, has been appointed a member of the board of directors of the Linwood Cement Co., Davenport, Iowa.

L. A. Lepres of the Canada Cement Co. Ltd., Montreal, Que., has been elected to the Transportation Committee of the Canadian Manufacturers' Association, which recently concluded its annual meeting at Hamilton, Ont. Edwin Tomlin of the British Columbia Cement Co. Ltd., Victoria, B. C., was elected to the Membership Committee; William Martin of the Manitoba Gypsum Co., Winnipeg, Man., to the Legislative Committee, and John Quinlan of the Quinlan Cut Stone Co. Ltd., Montreal, Que., to the Committee on Industrial Relations. Among those present were C. M. Doolittle of the Canada Crushed Stone Co. Ltd., Dundas, Ont., and Charles N. Ritchie, Ritchie Cut Stone Co., Hamilton, Ont.

Manufacturers

W. A. Jones Foundry and Machine Co., Chicago, has opened a branch sales office at Minneapolis, Minn., in charge of F. S. Van Bergen. The territory to be served by this branch is all of Minnesota, North Dakota and South Dakota, parts of Iowa and Wisconsin.

Coe Manufacturing Co., Painesville, Ohio, announces the moving of its Chicago office to room 1510 Conway building, 111 West Washington street. This office is in charge of H. R. Masters, who has been associated with the Coe company for five years as special drying engineer and previous to that time was manager of the drying department of the B. F. Sturtevant Co., Boston, Mass., specializing in paper mill installations.

Robert W. Hunt Co., Chicago, engineers, announces the appointment of Fred M. Randlett as district manager of the Pacific Northwest territory with offices in Portland, Ore., and Seattle,

Wash. Mr. Randlett has been chief engineer of the water department of the city of Portland for the past eight years and previous to that time was engaged in the engineering department of the New York, New Haven and Hartford Ry., and Stone and Webster, Inc.

T. H. Edelblute Co., Pittsburgh, Penn., has recently built a new and enlarged factory at Reynoldsville, Penn., to take care of the demand for its main product, the "Anchor" rerailer. The plant will be managed by N. G. Edelblute. The general sales office will be continued as before in the Wabash building, Pittsburgh.

Vulcan Iron Works, Wilkes-Barre, Penn., has received an order from Ramon Ferreyra of the Argentine Republic, S. A., for six Meade vertical lime kilns. These kilns are of the induced draft type and will be wood fired. Mr. Ferreyra also intends to install a hydrating plant which will make the first hydrated lime for the Republic.

Trade Literature

T. H. Edelblute Co., Pittsburgh, Penn., has issued a new bulletin describing and illustrating its rerailers. A table of sizes and specifications is included.

The Associated General Contractors of America, Inc., Washington, D. C., has published a code of ethical conduct adopted at the sixth annual meeting of the association.

Shepard Electric Crane and Hoist Co., Montour Falls, N. Y., has issued a new bulletin No. 88 briefly presenting its line of hoists, cranes, winches and speed reducers and listing the company's available descriptive books and bulletins, which may be procured by writing to the company.

William Ganschow Co., Chicago, has published a new bulletin No. 111 explaining the principles of the Ganschow planetary speed transformer and furnishing a complete list of the sizes, dimensions and ratios.

The Sanderson-Cyclone Drill Co., Orrville, Ohio, has prepared a new edition of its catalog B-55 entitled "Big Blast Hole Drills." This edition contains about 20 pages of semi-technical information which do not appear in the old edition.

Lincoln Electric Co., Cleveland, Ohio, has compiled and issued a manual on electric arc welders. The booklet is illustrated with diagrams and photographs showing different kinds of welds and welding jobs and gives instructions in a series of lessons on welding.

Traylor Engineering and Manufacturing Co., Allentown, Penn., has prepared a new general catalog No. 2000 superseding bulletin No. 1000. This catalog is in the form of a pocket edition and is quite complete with information, descriptions and illustrations.

Heisler Locomotive Works, Erie, Penn., has issued a new bulletin on Heisler locomotives. It consists of a series of photographs, showing these locomotives on the jobs, supplemented by verbal stories of results obtained. Tables are also given of the hauling capacities of the different classes of these geared locomotives.

The Jeffrey Manufacturing Co., Columbus, Ohio, has prepared and is issuing to the trade a new catalog No. 409 featuring its complete line of standardized belt conveyors of various types. The catalog is well illustrated with photos of the conveyors, drawings and installations. Considerable semi-technical and technical information is given as well as price lists and tables of capacities.

Pennsylvania Pump and Compressor Co., Easton, Penn., has prepared three new bulletins, Nos. 122, 123 and 124. The first gives a brief and thorough discussion of the company aftercoolers with a table of their sizes, capacities and weights. The second describes the Pennsylvania class 3-A and 4-A compressors and class 7-A and 8-A vacuum pumps, straight line, single stage types, power and steam driven. The third bulletin describes and illustrates its portable air compressors.

Joint Conference on Construction Practices, Washington, D. C., has published a bulletin of standard questionnaires and financial statements for bidders on engineering construction as a part of its policy working toward the stabilization of industry. It has also published the report of the committee on uniform questionnaires to be used in determining the responsibility and experence of contractors in the construction industry. Copies of the report may be secured from the chairman of the committee, S. M. Williams, vice-president of the Autocar Sales and Service Co., Ardmore, Penn.

Production and Developments in Quebec Asbestos Industry

By Roy Carmichael
Montreal, Que.

THE shipments and sales of asbestos in the Province of Quebec, Canada, in 1924 totaled 208,762 tons, valued at $6,561,659, as compared with 216,804 tons, valued at $7,364,260, in 1923. In tonnage it is a falling off of 3.8%, whereas in value the proportional decrease is nearly 11%. This decrease in value was due to competition among the mine operators, whereby prices were cut down from the previous year's prevailing rates.

The average price per ton of asbestos shipped in 1924 was $31.37 as compared with $33.97 in 1923. The contents of asbestos in the rock mined and the quality and length of the fibre produced was well maintained, and did not show any sign of decrease. The tonnage of asbestos rock mined and hoisted in 1924 was 3,324,727 tons, and it yielded an average of 124 lb. of fibre of all grades per ton of rock, representing a value of $1.83, in 1923 these figures were 117 lb., valued at $2.12.

The Asbestos Corporation of Canada during 1924 operated three mines, one at Thetford and two at Coleraine, while the fourth at East Broughton remained closed all year. At the King mine, Thetford, the new mill which was started December, 1923, gave very satisfactory results throughout the entire year 1924. This operating plant was erected to replace the one destroyed in 1923.

The Bennett-Martin Asbestos and Chrome Co. made a voluntary assignment to creditors on January 9, 1924. Neither the Thetford mine nor the Vimy Ridge mine were operated, only a few men being kept in the mills and yards. At the end of the year the liquidators had not yet concluded the winding up of the affairs, but all stocks which had remained in the sheds from the 1923 operations had been disposed of and shipped.

The Consolidated Asbestos, Ltd., mine was operated during the greater part of the year.

The Bell mine of Keasbey and Mattison Co., mines department worked practically continuously throughout the year. Removal of the overburden at the northwest end of the pit was carried on actively to extend mining operations in that direction. A large dust collecting shed was erected in connection with the mill.

The Maple Leaf Asbestos Corporation, Ltd., operated steadily their mine situated on lot 29, range "A" of Coleraine. The mining method was changed when spring operations were resumed, in March, by the installation of a steam shovel and the installing of a large crusher.

The Federal Asbestos Co. at Robertsonville operated its mine practically continuously throughout the year. The dryer building was rebuilt and another rotary dryer added. Several changes were introduced in the mill, improving the practice.

Work at the mine of Asbestos Mines, Ltd., was resumed on April 1, 1924, after closing down for the winter months, and except for a stop of six weeks in the late summer it was operated continuously. The management is considering the adoption of the new wet process of separation developed by Selective Treatment, Ltd., and in that case the mill will have to be remodeled.

The mine of the Canada Asbestos and Chrome Co., which in 1923 was worked under lease by the Asbestos Quarries, Ltd., was reopened for a couple of months and made small shipments.

The Jeffrey mine of the Canadian Johns-Manville Co. at Asbestos was operated the whole year without interruption. An important event in the Canadian asbestos industry was the opening of the manufacturing plant of the Canadian Johns-Manville at Asbestos, which was put in operation in June, 1924.

Johnson's Co. operated their Thetford property actively, but their Black Lake mine remained closed all year.

The Quebec Asbestos Corporation operated in their two mines, No. 1 and No. 2 at East Broughton, which are the old Ling mine and the Eastern Townships mine respectively. In mine No. 2 a new steam shovel is in use. A great deal of work was done on the surface in the latter part of the year, removing large quantities of overburden to extend operations.

Selective Treatment, Ltd., is a company organized some three years ago to develop a new asbestos milling process, to separate the asbestos fibre from the rock by water. This company erected an experimental and demonstration plant in 1923, and they report for 1924 having practically terminated the research work and perfected the process, so that its practical application is now assured. Plans are being completed for the construction of a plant to treat 720 tons of asbestos-bearing rock a day.

Record Production of Feldspar in Canada During 1924

FINALLY revised statistics on the production of feldspar in Canada during 1924, as reported by the Dominion Bureau of Statistics under the authority of the Hon. Thos. A. Low, shows that the sales of Canadian feldspar in 1924 advanced to a new high level of 44,804 tons valued at $237,601. In 1924 shipments comprised 16,147 tons from Quebec and 28,657 tons from Ontario properties.

Exports advanced 11,000 tons to a total of 37,869 tons, while the imports also showed an increase of 200 tons to a total of 1921 tons.